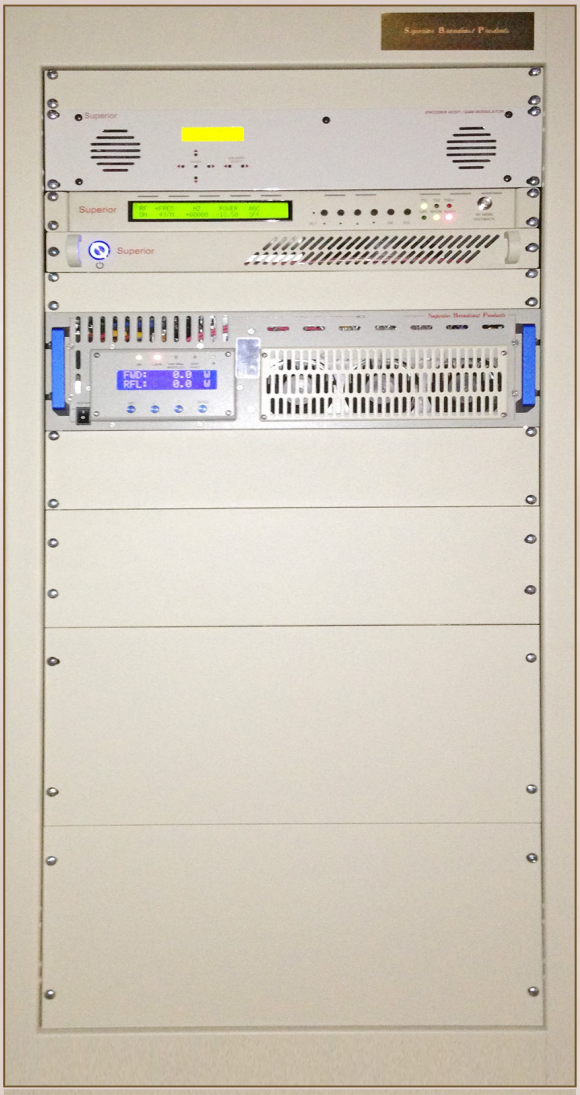
Superior Broadcast LLC

STU 600-D



User Manuals

Superior Broadcast LLC

18208 Preston Rd. Suite D9-297, Dallas, TX 75252. www.sbp-tv.com

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Superior Broadcast

ATSC 3000 Exciter

User Manual

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1 Product Appearance

1.1 Front Panel

LCD:

40×2 LCD with power saving backlight

Reset button:

RST: System reset button

6 Buttons:

Left, Right, Up, Down, OK, Esc (from left to right)

6 LEDs:

LED_TS1: Green light on indicates TS1 is selected and the input TS signal is OK

LED_TS2: Green light on indicates TS2 is selected and the input TS signal is OK

LED_TSErr: Red light on indicates the selected input signal has error (Refer to Chapter 5)

LED_ GPS: Green light on indicates 10 MHz reference signal connected and locked

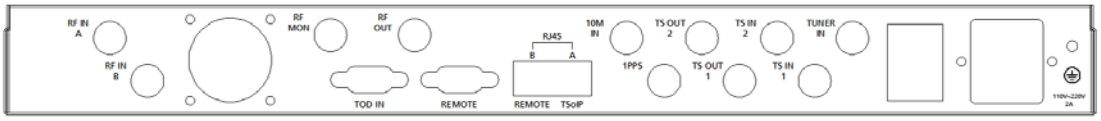
LED_ RFON: Green light on indicates system ready and RF on

LED_ SysErr: Flashing of the red light indicates some system error (Refer to Chapter 5)
Red light on indicates it's in "Local (LCL)" control mode, and red light off indicates it's in "Remote (RMT)" control mode

1 BNC connector:

RFMON: Loop out of feedback signal from port [RF_IN_A] for monitoring

1.2 Back Panel



RF_IN_A: Feedback signal after band-pass filter

RF_IN_B: Feedback signal before band-pass filter

RF_MON: Loop out of [RF_OUT] for monitoring

RF_OUT: RF signal output

TOD_IN (RS232): Reserved

REMOTE (RS232): Serial port for remote control

REMOTE (RJ45-B): 10M/100M Ethernet for remote control

TSoIP (RJ45-A): Reserved

10M_IN: 10 MHz input from external GPS receiver

1PPS: 1 PPS input from external GPS receiver

TS_IN_1: The first input for TS signal, ASI only

TS_OUT_1: Loop out of [TS_IN_1] for monitoring

TS_IN_2: The second input for TS signal, ASI only

TS_OUT_2: Loop out of [TS_IN_2] for monitoring

2 Operation Specifications

- Environment
  - Operating Temperature: -10 ~ 50 °C
  - Operating Humidity: ≤ 95%
  - Atmospheric Pressure: 86 kPa ~ 106 kPa
- Power Supply
  - Voltage: 88 ~ 264 VAC
  - Frequency: 50 / 60 Hz
- Inputs/Outputs
  - RF_IN_A /RF_IN_B
    - Connector: BNC female
    - Impedance: 50 Ω
    - Level: -30 dBm ~ 0 dBm
      Recommended range: -15 dBm ~ -5 dBm
    - Location: Back Panel
  - RF_OUT
    - Connector: N-type female
    - Impedance: 50 Ω
    - Level: -25 dBm ~ +5 dBm
    - VSWR: > 15 dB
    - Location: Back Panel
  - RF_MON (loop out of [RF_OUT])
    - Connector: BNC female
    - Impedance: 50 Ω
    - Level: -25 dB below [RF_OUT]'s output level
    - Location: Back Panel
  - 10M_IN
    - Connector: BNC female
    - Impedance: 50 Ω
    - Level: AC-coupled, $V_{P-P} \geq 300$ mV
    - Location: Back Panel
  - 1PPS (input)
    - Connector: BNC female
    - Impedance: 50 Ω
    - Level: 3.3 V-TTL
    - Input trigger: Positive Transition
    - Location: Back Panel
  - TS_IN_1/ TS_IN_2
    - Connector: BNC female
    - Impedance: 75 Ω
    - Level: See Table 1

- ◆ Location: Back Panel

■ TS_OUT_1/ TS_OUT_2

- ◆ Connector: BNC female
- ◆ Impedance: 75 Ω
- ◆ Location: Back Panel

■ RF_MON FEEDBACK (loop out of [RF_IN_A])

- ◆ Connector: BNC female
- ◆ Impedance: 50 Ω
- ◆ Level: -11 dB below [RF_IN_A]'s output level
- ◆ Location: Front Panel

Table 1 ASI Input Specifications

No	Content	Unit	Value
1	Input Level	mv	≥ 200
2	Positive Transition (20%~80%)	ps	≤ 1200
3	Negative Transition (20%~80%)	ps	≤ 1200
4	Deterministic Jitter	%	≤ 10
5	Random Jitter	%	≤ 8

Note

1) The interface electrical characteristics are measured under normal condition. Otherwise the values may change.
2) Operating under abnormal circumstances may cause dysfunction of the exciter. Long operating hours under severe environment may reduce the reliability of the entire system, which even causes permanent damage to electronic components. Ensure all interface electrical characteristics or environment parameters are within the defined range listed above before any operation.

3 Menu

3.1 Initialization

Connect power supply then turn on the exciter. The initialization process takes about 5 seconds to finish while RF output level increases gradually to the pre-set value.

3.2 Query Mode

Query mode is a mode which displays parameters and status of exciter. There are three pages in query mode. Press "Right" or "Left" button to switch between different pages which are shown from Table 2 to Table 4 as below.

Note: All the displayed settings or numbers in below tables are for illustration only and may be different from those in actual use.

Table 2 the First Page in Query Mode

TSNR	LID	UID
38.5	43.5	44.0

Table 3 the Second Page in Query Mode

INPUT	STA	TS_RATE	TEMP
TS1	OK	19.392816 Mbps	104.90°F

Table 4 the Third Page in Query Mode

FREQ	AGC	GPS	1PPS	CTRL	ADPC
683M	OFF	LOCK	OK	RMT	OFF

Note:

1) The "TSNR", "LID" and "UID" in Table 2 are the measurement of feedback signal quality. This feedback signal could be from a transmitter or the exciter itself and its input range is from -30 dBm to 0 dBm (Recommended range is -15 dBm to -5 dBm). Feedback signal is required to be connected port [RF_IN_A] ONLY. If there is no signal connected, these readings will not be available or not valid. The "TSNR" is measured with equalization on. It takes about 10 seconds to get the first reading on "TSNR", and about 3 seconds to get the first reading of "LID" and "UID". After averaging, the "TSNR" display upper limit is shown at about 39 dB and those of IMD are shown at about 54 dB.
2) The "CTRL" status in Table 4 has "RMT" (Remote) mode and "LCA" (Local) mode. When in "Local" mode, the exciter can only be controlled by the front panel interface and when in "Remote" mode, settings from the front panel keyboard are ignored - with the exception of "RMT"/"LCA" setting, and only commands from remote control interface, such as serial port or WEB, are processed.

3.3 Control Mode

Control mode is a mode to specify settings of exciter. To switch to control mode, press ***both***

"Left" and "Right" buttons ***at the same time*** in query mode. Main menu in control mode is shown in Table 5.

Table 5 Main Menu in Control Mode

Welcome to setting interface!			
*SYSTEM	RF	MODE	CONFIG

Main menu consists of 4 sub-menus: SYSTEM, RF, MODE and CONFIG.

When on main menu in control mode, press "Left" or "Right" button to move the cursor and press "OK" button to enter the target sub-menu. When in the corresponding sub-menu, press "Left" or "Right" button to move the cursor to the target parameter and then press "Up" or "Down" button to select options from the drop-down boxes. ***Press "OK" button to save, or press "ESC" button to skip the changes and return to upper menu.***

All the parameters of sub-menus are shown from Table 6 to Table 9 respectively.

Table 6 System Menu in Control Mode

	CTL	ADPC	RST
Default	RMT	OFF	NO
Options	RMT	OFF	NO
	LCA	UPDATE	YES
		HOLD	

Note:

1) The "CTL" (Control) setting has two options, "RMT" (Remote) and "LCA" (Local). The exciter can be switched between these two modes only via the front panel interface. When in "LCL" mode, the exciter can only be controlled by the front panel interface and all commands from serial port or WEB are ignored. When in "RMT" mode, settings from the front panel keyboard are ignored - with the exception of "RMT"/"LCA" setting, and only commands from remote control interface, such as serial port or WEB, are processed. The default value of "CTL" after "RST" is "RMT". Notice that LED "SysErr" remains on all the time in "LCA" mode, so only when it is flashing means there is some system error.
2) The "ADPC" parameter in "SYSTEM" sub-menu has options of "UPDATE", "HOLD" and "OFF". If option "OFF" is selected, the ADPC function will be turned off. If option "HOLD" is selected, it will ***restore*** the last time stored ADPC data instead of restarting a new ADPC process. If feedback signal are connected properly and option "UPDATE" is selected, it will start a complete ADPC function, including ***both the linear and non-linear*** pre-correction to the entire transmission system including the distortion of both transmitter and band-pass filter. Refer to Chapter 4 for detailed information.
3) The "RST" parameter in "SYSTEM" sub-menu has options "YES" and "NO". There will be a check page out to confirm the operation in order to avoid any mistake happening. If option "YES" on the check page is selected, the system will restore all default settings. This may lead to the ***change of exciter's output level*** (the default value is ***0 dBm*** after reset). To prevent any potential damage, disconnect all other device when the exciter is going to be reset.

Table 7 RF Menu in Control Mode

	*RF	FREQ	Hz	POWER	AGC
Default	ON	707M	+00000	+0.00	OFF
Options	ON	473M	-50000	-25.00	OFF
	OFF	479M	-49999	-24.95	ON
		485M	-49998	-24.90	
		...	...	...	
		...	...	...	
		...	...	...	
		875M	+49998	+4.90	
		881M	+49999	+4.95	
		887M	+50000	+5.00	

Note:

1) The "Hz" parameter in "FREQ" sub-menu is the direct adjustment of the frequency of RF output signal. The range is -50,000 Hz to +50,000 Hz, with steps of 1 Hz. This feature is designed for up to 50 kHz spectrum shift as ATSC standard required, or adjustment of the output frequency for carrier accuracy.
2) The "AGC" parameter in "RF" sub-menu has options "ON" and "OFF". If option "ON" is selected, the AGC function will be turned on. This function ensures a stable output level of exciter even under the variation of working temperature or mismatch impedance, and its adjustable range is from +1 dB to -10 dB. If AGC function is turned on, it is not suggested to change other settings of the exciter, such as output level or channel. Only use the AGC function when the exciter or the entire transmitting system has been stable.

Table 8 MODE Sub-menu in Control Mode

8VSB

Table 9 CONFIG Menu in Control Mode

	*ID	bps	IP	GATEWAY	MASK	UPGRADE
Default	ID: 80H	19200	192.168.001.143	192.168.001.001	255.255.255.000	NO
Options	ID: 80H	19200	***.***.***.***	***.***.***.***	***.***.***.***	NO
	ID: 00H	9600				YES
	...	38400				
	ID: FEH					
	ID: FFH					

Note:

1) "UPGRADE" is a mode to upgrade the firmware of micro controller. It's only available for advanced users. If there is any misoperation, restart the exciter to cancel the upgrade process.
2) "IP", "GATEWAY", and "MASK" are used to establish a valid Ethernet connection for remote control via RJ45. The exciter has a built-in WEB GUI which requires only a standard web browser run by a PC. Simply by entering specified IP address, which is setup in CONFIG sub-menu, in a browser's address bar, the login interface will pop up and give user prompts to input user name and password. Both the default user name and password are "admin" (case sensitive). The "admin" account only allows users to retrieve information such as SNR and shoulder measurements, user configuration, and alarms. Only some basic settings such as RF switch, Power, are accessible in "admin" account. To get a full control of the exciter, please log in with the root account, whose user name and password are "user" and "ANWP" (case sensitive).

4 Connection

4.1 Connect the Transmitter

- Don't turn on or off the exciter when the transmitter is running. The correct order is:
  - First of all turn on the exciter.
  - Measure the RF output level of the exciter to make sure it meets the requirement of the transmitter input level. If the output level is out of range, change the parameter "POWER" in "RF" sub-menu in control mode to make the adjustments. Refer to Table 7, Chapter 3 for details. If the output signal level is within range, connect the exciter's output (port [RF_OUT] on back panel) to the transmitter's input.
  - After the exciter is stable, turn on the transmitter.
  - Likewise, turn off the transmitter first before making any change to the exciter's settings. Restart the transmitter after the exciter is stable again.

4.2 Start ADPC function

- After the exciter is connected to a transmitter, first of all measure the level of the transmitter's output (both ***before and after*** band-pass filter). Make sure it meets the requirement of exciter's feedback level (-30 dBm ~ 0 dBm and recommended range is -15 dBm to -5 dBm).
  - If the signal level is out of range, use extra devices, e.g. attenuator, to make adjustments.
  - If the signal level is within the range, connect the transmitter's output which is ***before*** band-pass filter to port [RF_IN_B] and another output which is ***after*** band-pass filter to port [RF_IN_A] respectively. Figure 1 below demonstrates the correct connection.
- Start ADPC function
  - Select option "UPDATE" on "ADPC" of SYSTEM sub-menu in control mode. Save the change, then all 3 parts of the ADPC process starts automatically in sequence, with tips ("Wait a moment...") and readings of "TSNR", "LID" and "UID" shown on LCD. Usually it takes about 10 minutes to finish the total compensation of both ***the linear and non-linear*** distortion in the whole transmission system including both power amplifier and band-pass filter. Following each part, there is a "Saving" process which takes from seconds to minutes to save necessary ADPC data into the on-board memory.
  - Readings of "TSNR", "LID" and "UID" provide a continuous measurement and display of quality of feedback signal during the ADPC process. Compare these readings before and after the ADPC process as the reference of compensation performance. Restart or abort the ADPC progress if compensation doesn't bring up a better signal quality.
  - There is a "Loading" process if the exciter is turned on again or "HOLD" option is selected. It mainly ***restores*** the ADPC data saved last time when an entire ADPC process has been run successfully.

Note:

1) To monitor the entire process, connect the output of [RF_MON FEEDBACK] which is on front panel) to equipment for measurement. The level of [RF_MON FEEDBACK] is about 11 dB lower than the feedback signal which is connected to port [RF_IN_A].
2) Do not change the connection status during the ADPC process otherwise it may affect the

performance.

3) If any abnormal situation occurs during the ADPC process, the system will bypass all the pre-correction data immediately and leave the corresponding tips on LCD. Press any key to cancel the ADPC function manually and restart the ADPC function again after the problems are resolved. Refer to Chapter 5 for further information.

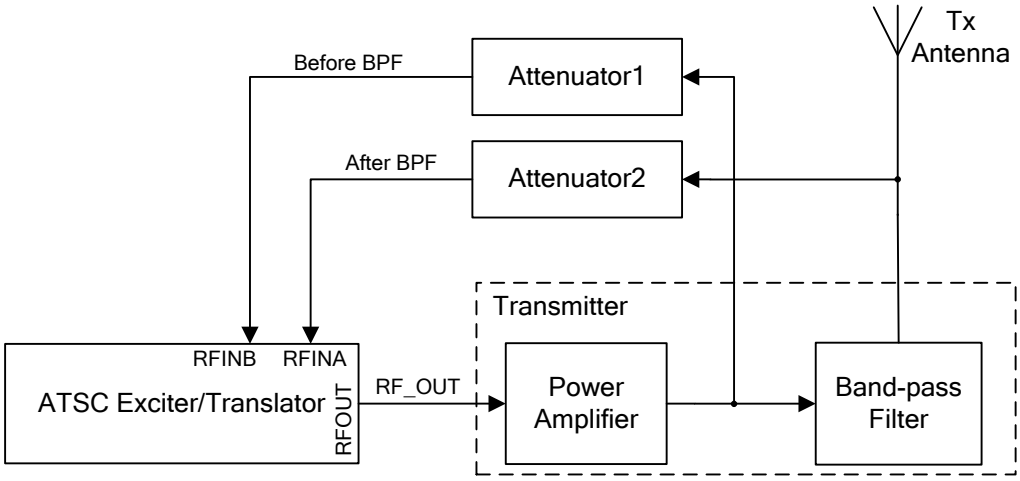


Figure 1 Connection with Transmitter of UPDATE Function

5 Troubleshooting

5.1 Input

- TS1 ERROR
  - Alarm message
    - LCD: TS1 ERR
    - LED_ TS1: Off
    - LED_ TSErr: On
  - Cause: Input signal from port [TS_IN_1] is lost or has invalid format.
  - Solution: Check connection of port [TS_IN_1], and make sure input signal has valid format.
- TS2 ERROR
  - Alarm message
    - LCD: TS2 ERROR
    - LED_ TS2: Off
    - LED_ TSErr: On
  - Cause: Input signal from port [TS_IN_2] is lost or has invalid format.
  - Solution: Check connection of port [TS_IN_2], and make sure input signal has valid format.
- Transport Stream Rate Overflow or Underflow
  - Alarm message
    - LCD: TS_RATE Overflow
  - Cause: The input TS bit rate is higher than the bit rate required
  - Solution: Adjust the TS input bit rate. Or connect all devices with the same reference clock (GPS).

  Note:

  The exciter has bit rate auto-adaptation function to deal with the bit rate mismatch. It will automatically delete null packets or insert null packets when necessary to achieve the accurate acquired bit rate.

5.2 ADPC

- Feedback Signal Level
  - Alarm message
    - LCD: " FEEDBACK TOO BIG! Press Any key to Esc"
      Or " FEEDBACK TOO SMALL! Press Any key to Esc"
    - LED_ SysErr: Flashing (during the ADPC process)
  - Cause: Feedback signal level is too high or too low.
  - Solution: Cancel the ADPC function manually and then adjust the input level of the feedback signal according to the messages on the LCD. Start the ADPC function again after the problem is resolved.

  Note:

  The acceptable range of feedback signal from port [RF_IN_A] or [RF_IN_B] is -30

dBm to 0 dBm, and the recommended range is from -15 dBm to -5 dBm.

- Feedback Signal Connection Error
  - Alarm message
    - LCD: FEEDBACK LINK ERROR! Press Any key to Esc
    - LED_ SysErr: Flashing (during the ADPC process)
  - Cause: Feedback signal connection is interrupted, or signal level changes dramatically during the ADPC process.
  - Solution: Cancel the ADPC function manually and then check the connection and the level of the feedback signal. Start the ADPC function again after the problem is resolved.
- ADPC Error
  - Alarm message
    - LCD: ADPC ERROR! Press Any key to Esc
    - LED_ SysErr: ON (during ADPC process)
  - Cause: The ADPC process goes wrong.
  - Solution: Cancel the ADPC function manually and then check the product status. Start the ADPC function again after the problem is resolved.

5.3 Other Problems

- Temperature
  - Alarm message
    - LCD: TEMP HIGH
    - LED_ SysErr: ON
  - Cause: The Temperature of the exciter is too high.
  - Solution: Cool the exciter.
- No RF output
  - Alarm message
    - LCD: None
    - LED_ RFON: Off
  - Cause: RF output can be turned off via front panel or serial port or WEB interface. Or if the exciter has a breakdown, there would be no RF output too.
  - Solution: Check the setting of "RF" via front panel, serial port or WEB interface. Restart the exciter if necessary. If the problem still exists, contact the manufacturer for further solution.

Note:

If "Slow ON/OFF" function is turned on (user configurable in advanced settings), during power changing process, LED_RFON may be flashing.

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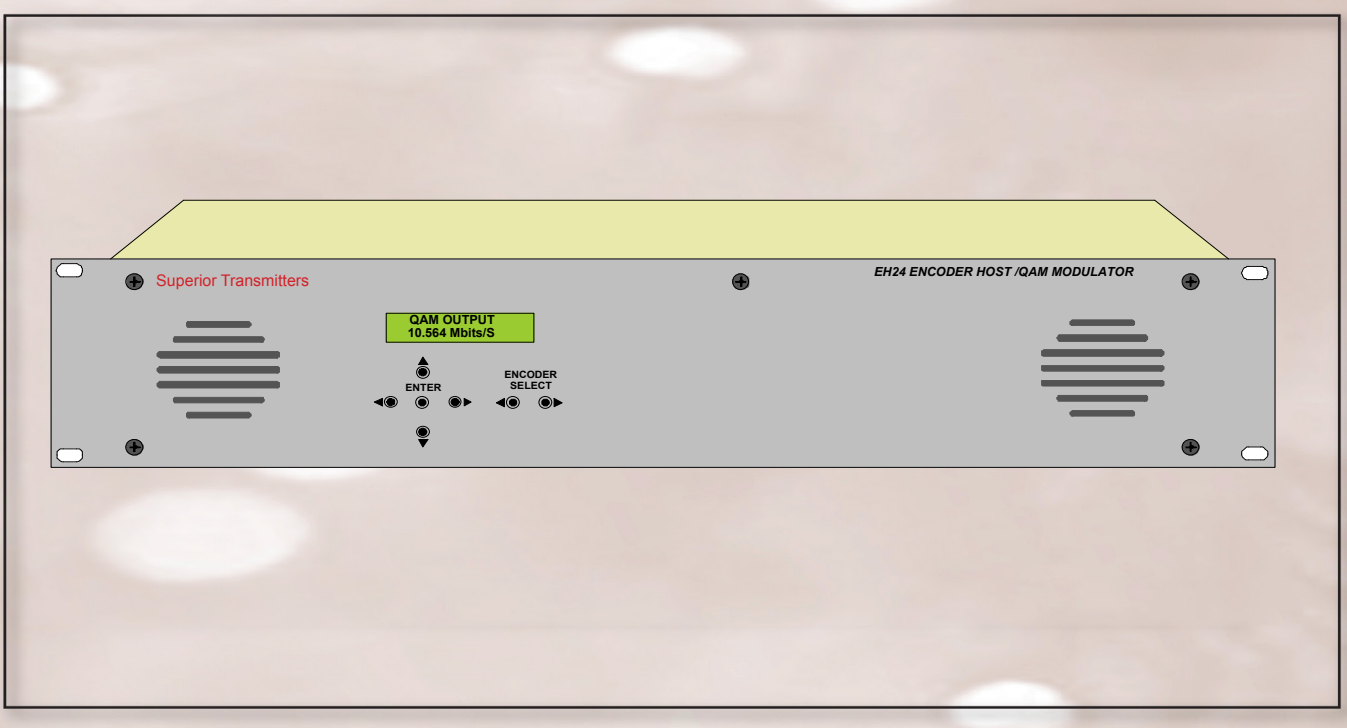
EH24 Encoder Host With SDE24 Encoders

Instruction Manual



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WARNING: TO PREVENT FIRE OR ELECTRICAL SHOCK DO NOT EXPOSE TO RAIN OR MOISTURE

CAUTION

RISK OF ELECTRIC SHOCK DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER
NO USER-SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED PERSONNEL

A product and cart combination should be moved with care. Quick stops, excessive force and uneven surfaces may cause the product and cart combination to overturn.

The lightning flash with arrow head symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.
DO NOT OPEN THE CABINET, REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

CAUTION: TO PREVENT ELECTRIC SHOCK, DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENTION: POUR PREVENIR LES CHOCS ELECTRIQUES, NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

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1. Read Instructions—All the safety and operating Instructions should be read before the product is operated.
1a. Lire les directives -Toutes les directives de sécurité et d'utilisation devraient être lues avant de mettre l'appareil en opération.
2. Retain Instructions—The safety and operating instructions should be retained for future reference.
2a. Conserver les directives – Les directives de sécurité et d'utilisation devraient être conservées pour consultation future.
3. Heed Warnings—All warnings on the product and in the operating instructions should be adhered to.
3a. Tenir compte des avertissements –Tous les avertissements apparaissant sur l'appareil et dans les consignes d'utilisation devraient être respectés.
4. Follow instructions - All operating and use instructions should be followed.
4a. Suivre les directives - Toutes les directives d'opération et d'utilisation devraient être suivies.
5. Cleaning—Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleansers. Use a damp cloth for cleaning.
5a. Nettoyage – Débrancher l'appareil de la prise électrique murale avant le nettoyage. Ne pas utiliser de nettoyants liquides ou aérosols. Employer un linge humide pour le nettoyage.
6. Attachments—Do not use attachments that are not recommended by the product manufacturer as they may cause hazards.
6a. Fixation – Ne pas utiliser d'autres fixations que celles recommandées par le manufacturier; elles pourraient être source de dangers.
7. Water and Moisture—Do not use this product near water—for example, near a bathtub, wash bowl, kitchen sink or laundry tub; in a wet basement; or near a swimming pool; and the like.
7a. Eau et humidité – Ne pas utiliser cet appareil près de l'eau. Par exemple, près d'une baignoire, d'un bac de lavage, d'un évier de cuisine ou d'une cuvette de lessivage; dans un sous-sol humide; ou à proximité d'une piscine; et autres environnements similaires.
8. Accessories—Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
8a. Accessoires – Ne pas installer cet appareil sur un chariot, un socle, un trépied, un support ou une table instables. L'appareil pourrait tomber, entraînant des blessures graves à un enfant ou à un adulte, et des dommages importants à l'appareil. Employer seulement avec un chariot, un socle, un trépied, un support, ou une table recommandés par le fabricant ou vendu avec l'appareil. Toute installation de l'appareil devrait être conforme aux directives du manufacturier et devrait utiliser des accessoires d'installation recommandés par celui-ci.
9. A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.
9a. Un chariot supportant l'appareil devrait être déplacé avec précaution. Les arrêts brusques, la force excessive et les surfaces inégales peuvent renverser le chariot.
10. Ventilation—Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or similar surface. This product should not be placed in a built-in installation such as bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.
10a. Ventilation – Des fentes et ouvertures dans le châssis sont prévues pour la ventilation de l'appareil, pour en assurer la fiabilité d'opération et le protéger contre la surchauffe. Ces ouvertures ne doivent pas être bloquées ou recouvertes. Ces ouvertures ne devraient jamais être bloquées en plaçant l'appareil sur un lit, un sofa, une couverture, ou une surface semblable. Cet appareil ne devrait pas être installé dans un meuble encastré comme une bibliothèque ou une étagère à moins de lui fournir une ventilation adéquate ou que l'installation soit conforme aux directives du manufacturier.
11. Power Sources—This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.
11a. Sources d'alimentation électrique - Cet appareil devrait être utilisé seulement avec le type d'alimentation électrique inscrite sur l'étiquette. Si vous n'êtes pas certain du type d'alimentation électrique fourni à votre maison, consultez le vendeur de l'appareil ou l'entreprises d'énergie locale. Pour des appareils alimentés par une batterie ou d'autres sources, se référer aux consignes d'utilisation.
12. Grounding or Polarization—This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other) This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
Alternate Warnings—If this product is equipped with a three-wire grounding-type plug, a plug having a third (grounding) pin, the plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.
12a. Mise à la terre ou polarisation - Cet appareil peut être équipé d'une fiche électrique de courant alternatif polarisée (une fiche ayant une lame plus large que l'autre). Cette fiche ne s'insérera correctement dans la prise de courant que d'une seule façon; c'est un dispositif de sécurité. S'il est impossible d'insérer la fiche entièrement dans la prise de courant, essayer de renverser la fiche. Si la fiche ne s'insère toujours pas, contacter un électricien pour remplacer la prise de courant désuète. Ne pas altérer le dispositif de sécurité de la fiche polarisée.
Mise en garde supplémentaire - Si cet appareil est équipé d'une fiche électrique à trois broches (une fiche ayant une broche de mise à la terre), la fiche s'insérera seulement dans une prise de courant équipée d'une mise à la terre; c'est un dispositif de sécurité. S'il est impossible d'insérer la fiche dans la prise de courant, contacter un électricien pour remplacer la prise de courant désuète. Ne pas altérer le dispositif de sécurité de la fiche avec mise à la terre.
13. Power-Cord Protection—Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.
13a. Protection du cordon d'alimentation - Les cordons d'alimentation devraient être disposés de façon à ce qu'on ne puisse marcher dessus ou qu'ils soient susceptibles d'être coincés par des articles placés sur ou contre eux. Une attention particulière doit être portée aux fiches, prises de courant, et aux points où ils sortent de l'appareil.
14. Outdoor Antenna Grounding—If an outside antenna or cable system Is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
See Figure A.
14a. Mise à la terre de l'antenne extérieure - Si un système extérieur d'antenne ou de câble est relié à l'appareil, s'assurer que le système d'antenne ou de câble est muni d'une mise à la terre afin de fournir une certaine protection contre les surtensions et les charges d'électricité statique. L'article 810 du code électrique national, ANSI/NFPA 70, fournit l'information nécessaire en ce qui concerne la mise à la terre appropriée du mât et de la structure porteuse, la mise à la terre du câble de connexion à une unité de décharge d'antenne, le calibre des conducteurs de mise à la terre, la location de l'unité de décharge d'antenne, le raccordement aux électrodes de mise à la terre et les spécifications pour les électrodes de mise à la terre.
Voir la figure A.
15. Lightning—For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug It from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.
15a. Foudre - Pour une protection supplémentaire de cet appareil pendant un orage électrique, ou quand il est laissé sans surveillance et inutilisé pendant de longues périodes, le débrancher de la prise électrique murale et déconnecter le système d'antenne ou de câble. Ceci préviendra les dommages à l'appareil dus à la foudre et aux surtensions.
16. Power Lines—An outside antenna system should not be located in the vicinity of overhead power lines, other electric light or power circuits, where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them may be fatal.
16a. Lignes électriques - Un système d'antenne extérieur ne devrait pas être situé à proximité de lignes électriques aériennes ou de tout autre circuit électrique, où il pourrait tomber sur de tels circuits ou lignes électriques. Lors de l'installation d'un système d'antenne extérieur, d'extrêmes précautions devraient être prises afin de prévenir tout contact avec des lignes ou circuits électriques. Entrer en contact avec de tels circuits ou lignes électriques pourrait être fatal.
17. Overloading—Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.
17a. Surcharge – Ne pas surcharger les prises de courant murales, les rallonges électriques ou les prises de courant intégrées. Un risque d'incendie ou de choc électrique pourrait résulter d'une telle surcharge.

18. Object and Liquid Entry—Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
18a. Insertion d'objet ou de liquide – Ne jamais insérer d'objet par les ouvertures de cet appareil. Il pourrait toucher des points de voltage dangereux ou court-circuiter des pièces, ce qui pourrait résulter en incendie ou en choc électrique. Ne jamais verser de liquide sur l'appareil.
19. Servicing—Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
19a. Entretien –Ne pas essayer de faire soi-même l'entretien de cet appareil. En ouvrir ou en retirer les couvercles pourrait vous exposer à des voltages dangereux ou à d'autres dangers. Confier tout entretien à un personnel de service qualifié.
20. Damage Requiring Service—Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
a. When the power-supply cord or plug is damaged,
b. If liquid has been spilled, or objects have fallen into the product,
c. If the product has been exposed to rain or water,
d. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation,
e. If the product has been dropped or damaged in anyway, and
f. When the product exhibits a distinct change in performance—this indicates a need for service.
20a. Dommage exigeant un entretien - Débrancher cet appareil de la prise de courant électrique et confier l'entretien au personnel de service qualifié dans les éventualités suivantes:
a. Quand le cordon d'alimentation ou sa fiche sont endommagés,
b. Si des objets sont tombés dans l'appareil, ou si du liquide y a été renversé,
c. Si l'appareil a été exposé à la pluie ou à l'eau,
d. Si l'appareil ne fonctionne pas normalement en suivant les consignes d'utilisation.
Ajuster seulement les commandes qui sont mentionnées dans le guide d'opération. Un mauvais ajustement des autres commandes pourrait causer des dommages à l'appareil et souvent exiger un travail supplémentaire de la part d'un technicien qualifié pour remettre l'appareil en état normal d'opération.
e. Si l'appareil a été échappé ou endommagé de n'importe quelle façon, et
f. Quand l'appareil montre un changement notable de performance – ceci indique qu'un entretien est nécessaire.
21. Replacement Parts—When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutes may result in fire, electric shock or other hazards.
21a. Pièces de rechange - Si des pièces de rechange sont nécessaires, s'assurer que le technicien de service a employé des pièces de rechange spécifiques du manufacturier ou ayant les mêmes caractéristiques que les pièces originales. L'utilisation de pièces de rechange non autorisées pourrait résulter en incendie, choc électrique ou autres dangers.
22. Safety Check—Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
22a. Vérification de sécurité – À la suite de toute réparation ou entretien de cet appareil, demander au technicien de service d'exécuter des vérifications de sécurité afin de s'assurer que l'appareil est en condition normale de fonctionnement.
23. Wall or Ceiling Mounting—The product should be mounted to a wall or ceiling only as recommended by the manufacturer.
23a. Montage au mur ou au plafond - L'appareil ne devrait être monté au mur ou au plafond qu'uniquement de la façon recommandée par le manufacturier.
24. Heat—The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.
24a. Chaleur – L'appareil devrait être situé loin de sources de chaleur telles que des radiateurs, des registres de chaleur, des fourneaux, ou d'autres appareils (y compris amplificateurs) produisant de la chaleur.

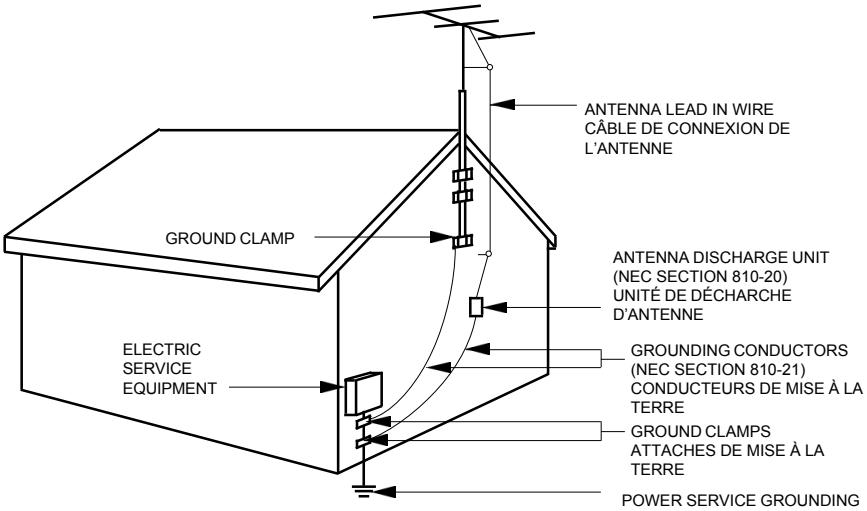
Figure A

Example of antenna grounding as per National Electrical Code, ANSI/NFPA 70

Exemple de mise à la terre d'antenne selon le code électrique national, ANSI/NFPA 70

NOTE TO CATV SYSTEM INSTALLERS:
THIS REMINDER IS PROVIDEO TO CALL THE CATV SYSTEM INSTALLER'S ATTENTION TO ARTICLE 820 - 40 OF THE NEC THAT PROVIDES GUIDELINES FOR PROPER GROUNDING AND, IN PARTICULAR, SPECIFIES THAT THE CABLE GROUND SHALL BE C0NNECTED TO THE GROUNDING SYSTEM OF THE BUILDING, AS CLOSE TO THE POINT OF CABLE ENTRY AS PRACTICAL.

NOTE AUX INSTALLATEURS DE SYSTÈME DE CATV :
CE RAPPEL EST FOURNI POUR PORTER À L'ATTENTION DES INSTALLATEURS DE SYSTÈME DE CATV, L'ARTICLE 820 - 40 DU NEC QUI DONNE DES DIRECTIVES POUR UNE MISE À LA TERRE APPROPRIÉE ET, EN PARTICULIER, SPÉCIFIE QUE LE CÂBLE DE MISE À LA TERRE DEVRAIT ÊTRE RACCORDÉ AU SYSTÈME DE MISE À LA TERRE DU BÂTIMENT LE PLUS PRÈS POSSIBLE DE L'ENTRÉE DU CÂBLE.


ANTENNA LEAD IN WIRE
CÂBLE DE CONNEXION DE L'ANTENNE
GROUND CLAMP
ANTENNA DISCHARGE UNIT (NEC SECTION 810-20)
UNITÉ DE DÉCHARCHE D'ANTENNE
ELECTRIC SERVICE EQUIPMENT
GROUNDING CONDUCTORS (NEC SECTION 810-21)
CONDUCTEURS DE MISE À LA TERRE
GROUND CLAMPS
ATTACHES DE MISE À LA TERRE
POWER SERVICE GROUNDING ELECTRODE SYSTEM (NEC ART 250. PART H)
SYSTÈME DE MISE À LA TERRE DU BÂTIMENT

NEC - NATIONAL ELECTRIC CODE

NEC – CODE ÉLECTRIQUE NATIONAL

SPECIFICATIONS

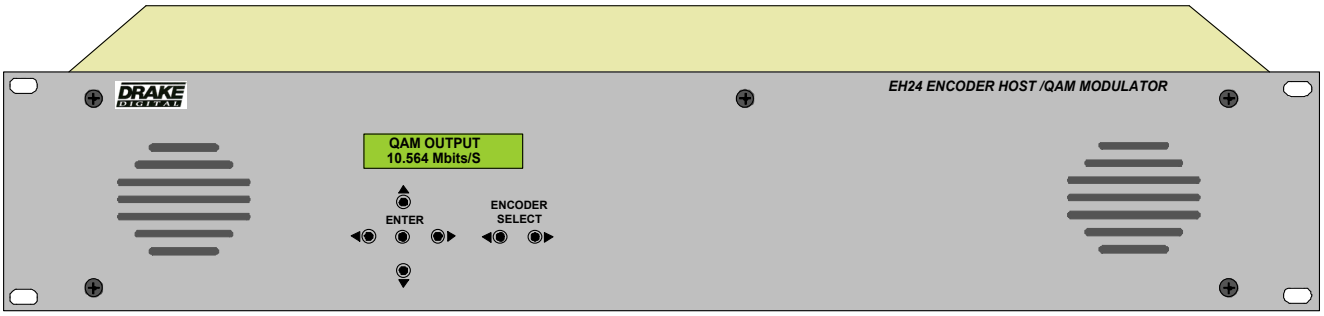
SDE24 Dual Program Encoder Module

Analog Interface	
Composite video Inputs	2 composite inputs, one for each program
Composite Video Input Level	1 Volt p-p ± 3 dB
S Video Inputs	2 S Video connectors, one for each program
Composite or S Video select	User selectable for each program input
Audio Inputs, for 2 programs	RCA type for L and R audio channels, 2 sets
Audio Input Level	1 Vrms or 2 Vrms user selectable and user adjustable audio gain ± 15dB
MPEG Encoder	
Encode Format - #1 input	MPEG2 or MPEG4 H.264, selectable
Encode Format - #2 input	MPEG2 only
Encoding Bitrate	Constant Bitrate: 1 Mbps to 8 Mbps
Video Adjustments	Brightness, Contrast, Saturation, Hue
Audio Encoder	
Selectable Types	AC-3 Dolby digital Stereo OR MPEG1, Layer 2 (MP2)
AC3 Encoder	Manufactured under license from Dolby Laboratories.
Output bitrate	320 kbps
Output	The output of each SDE24 module is connected internally to the multiplexers that are included in the EH24 chassis.
SDE24EAS Module	MPEG2 Encodes NTSC EAS alert program. Used to add EAS to an EH24 system. Can be used for SCTE18 operation, for program replacement in all SDE24 encoders, or both.
Usage	Only one SDE24EAS is required per headend. Must be inserted into slot number 6 of the master EH24 chassis.
ASII Module	ASI input module for inputting an EAS program that is looped out of the master EH24(ASI Out) (containing the SDE24EAS) and also for inputting low speed data for DTA channel mapping and code updating.
Usage	Used in an EH24 to add DTA data or used in an EH24, for EAS alert programming that is being sourced by a 'master' EH24/SDE24EAS. (See pages 6,10 and 15 for more details.)

SPECIFICATIONS (Continued)

EH24 CHASSIS

Program Filtering and Grooming	Encoded programs may be disabled or sent to one or both output ports - ASI or QAM, user selectable. The output timing is restamped and null packets are managed as required.
Multiplexer	Built in multiplexer circuitry combines the outputs of all enabled encoders in an EH24 into multiprogram transport streams, one to the QAM output and one to the ASI output.
MPEG Program Numbers	MPEG program numbers in the output transport stream by default will be assigned sequentially, corresponding to the encoder number. The leftmost encoder input, as viewed from the rear panel, will be # 1. If the RS232 remote access is used, the MPEG and virtual channel (major and minor) numbers may be user selected to any desired MPEG-legal numbers and program names, up to 7 characters in length, may be added.
ASI Output	Any or all of the enabled encoders may be directed to the ASI output by means of the user selectable program filter. If EAS operation is used, this output can be assigned to loop the EAS alert program to additional EH24s. It can also loop DTA data.
QAM Modulator	Any or all of the enabled encoder outputs may be directed to the QAM Modulator by means of the user selectable program filter.
Output Symbol Rate	1 to 7 MSps
Modes/FEC	ITU-A: 16, 32, 64, 128, 256, 512,1024 QAM ITU-B (DigiCipher): 64, 256, 1024 QAM
I/Q Phase Error	Less than 1 degree.
MER	Greater than 38 dB with blind EQ
Up Converter RF OUT	
Output Frequency Range	54 to 1002 MHz
Channel Plans	CATV STD, HRC, IRC, BROADCAST
Frequency Stability	± 5ppm
Output Level	45 dBmV to 61 dBmV, adjustable
Output Level Accuracy	± 1 dB
Output Impedance	75 Ohms, RL 14 dB or better, 54 - 1002 MHz
Spurious outputs	- 60 dBc from 40 to 1000 MHz
Broadband Noise	Less than -12 dBmV (6 MHz BW@ ± 12 MHz)
Phase Noise	-101 dBc @ 10 kHz offset
GENERAL	
AC Power	90 to 264 VAC / 47 - 63 Hz, 70 W maximum
Operating Temperature	0 deg to + 50 deg C
FCC Approvals	The EH24 and the encoder modules have been verified as complying with part 15 of the FCC rules.
Mechanical	
EH24	14 1/4" D x 3 1/2" H x 19" W, 9.5 lbs
SDE24, SDE24EAS, ASII	8" D x 1 3/8" W x 3 1/4" H, approx. 0.5 lbs



GENERAL DESCRIPTION

EH24

The Drake model EH24, encoder host, is the core multiplexer, QAM modulator, up-converter, ASI output, user interface, and power supply for the SDE24 encoder modules. Up to six encoder modules can be installed into the EH24 via rear panel access. SD encoders can encode one or two programs, depending on whether MPEG2 or MPEG4/H.264 encoding is used (see below), per module.

Typical applications are to provide MPEG video in MDUs, medical facilities, libraries, stadium video networks, private cable and other QAM applications. The EH24 may be used in Edge or headend applications. There are two multiplexers in the EH24, one providing an ASI output stream and one providing a stream to the built in QAM modulator/upconverter. The latest firmware release provides EAS implementation and allows low speed data streams to be added to the output for purposes such as DTA channel mapping and code upload.

SDE24

Each SDE24 module contains two encoders and if MPEG2 encoding is desired for two programs, two MPEG2 transport streams can be generated. If MPEG4, H.264 encoding is desired, each SDE24 module can encode one program to an H.264 output stream. Another option is to encode one program in MPEG2 and the second program in H.264. The SDE24 accepts either NTSC or PAL video inputs.

SDE24EAS

This is a specialized version of the SDE24 to be used, when EAS is needed, to encode the EAS program. EAS mode is provided by one of 2 methods, or both.

1) By installing the SDE24EAS module in slot 6 of the EH24. This module has only a single composite input instead of the two inputs of the standard SDE24. It's video and audio input will be provided by an external EAS contoller providing a NTSC composite alert message. When EAS is activated, the transport stream, created by the SDE24EAS, replaces the transport streams that were coming from the other encoder modules in the EH24. All programs will then become the EAS alert program. Only one SDE24EAS is required per headend. The alert can be encoded in either MPEG2 or MPEG4/H.264. All programs will be the same.

2) SCTE18 mode. In this mode, when an EAS alert is activated, the EH24 will place the SCTE18 table into the transport stream. The SDE24EAS will encode the alert program. SCTE18 capable receivers are told where to tune.

EH24 FEATURES

The EH24 encoder host platform is a 19" rack mountable chassis that is 2 RU tall and can accept up to six modules that are inserted into slots via the rear panel.

SD Encoding: The SDE24 is the SD dual encoder module. Up to six of these modules could be installed in the EH24. Programs can be encoded in MPEG2 or MPEG4/H.264 (AVC). Audio is encoded using a choice of Dolby Digital AC-3 encoding or MPEG1, layer 2 (MP2)encoding.

EAS Message Encoding: If EAS is to be utilized, then up to 10 SD MPEG2 programs or 5 SD H.264 programs, or a mix, may be encoded in each EH24 in addition to an EAS message program that is encoded in slot 6 of just one 'master' EH24. One SDE24EAS is required per headend to be installed in the 'master' EH24. Additional 'slave' EH24s can be included via simple ASI looping through each EH24 using an ASII card in slot 6 of all slave EH24s. The EH24 supports the emergency alert system in two ways. SCTE18 table support is provided and also substitution of normal program video with EAS program video, on all EH24 encoded program PIDs, is provided. Either method or both may be operator selected.

Program Filtering and Multiplexing: The EH24 contains transport stream multiplexers that can multiplex any or all of the program streams from the encoders. The user may select what programs from the encoders to include in the QAM output channel and also the user can select, independent of the QAM output, what programs to output via the DVB-ASI port. The QAM RF output can be specified for either off-air or CATV frequency plans in the 54 to 1002 MHz spectrum. The EH24 and installed encoder modules are powered by a built in power supply.

DTA Data Support: One input slot in an EH24 can be used to input low speed data via ASI that may be used by system DTAs (Digital Transport Adapters). A Drake created PC program can be used to generate the data that would be then input to the EH24. This data generates a transport stream to provide a channel map (SCTE65 tables) for the DTAs. Also, firmware update data can be sent to the DTAs if needed.

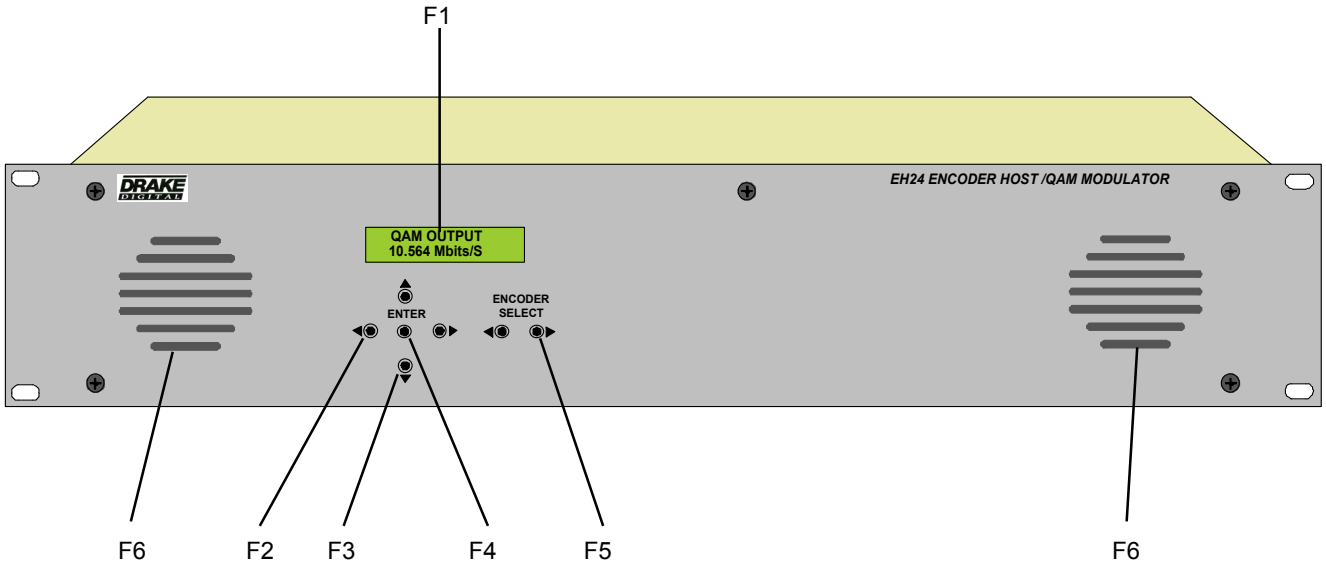
ASII: The Drake model ASII input module is supported to provide an ASI input for slave EAS operation and for DTA data input as described in previous paragraphs.

INSTALLATION AND MOUNTING NOTES

This equipment is designed to be installed in a standard 19" rack. When the unit is mounted above or below other rack mounted equipment, a 1U space (1.75") should be left between the unit and the other equipment to allow ambient air flow between the units. No space is needed between EH24 units themselves due to the ventilation provided by their built in fans.

Connect the AC line cord to an appropriate source of 120 volt, 50/60 Hz AC power. The EH24 is always on once the AC power cord is connected to its power source.

FRONT PANEL CONTROLS



F1, LCD Display - This display presents the selected menu screen and the parameter settings. The backlight in the display is on when power is applied.

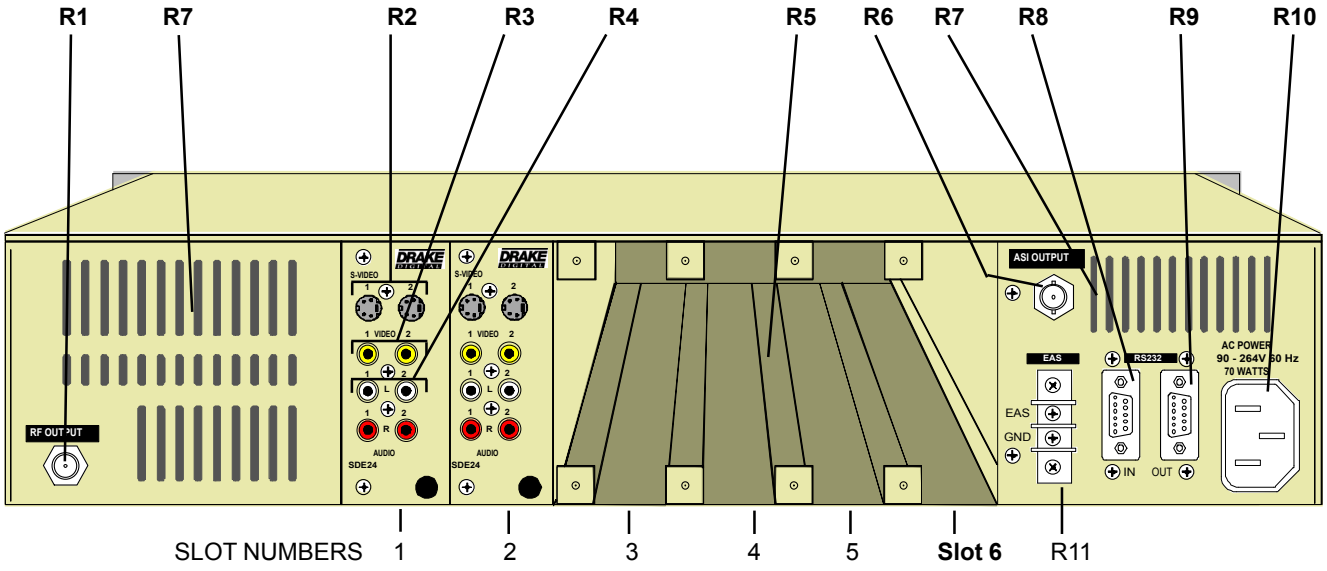
F2, ◀ Left and ▶ Right Buttons – Use the left and right arrow buttons to navigate from screen to screen to view a parameter setting within a particular program group. These buttons are operational in the view mode or the program mode. Using only these buttons will not change any parameter setting.

F3, ▲ Up and ▼ Down Buttons – Use the up and down arrow buttons to change the value of a viewed parameter setting. The unit must be in the program mode in order for these buttons to become active for changing a parameter setting. If the unit is not in the program mode, pressing the ▲ **Up** button will show the version number of the EH24 firmware. Repeatedly pressing the ▼ **Down** button will toggle between showing the Mbits/S for QAM and the Mbits/S for ASI.

F4, ENTER Button - Use the ENTER button to enter the program mode or to save and load a new setting or settings after adjustment. Hold for approximately 2 seconds until the bottom line of the display starts to flash to enter the program mode. After entering the program mode, momentarily pressing the ENTER button again will load and save any settings that may have been changed using the Up and Down buttons.

F5, ◀ Left and ▶ Right ENCODER SELECT Buttons - Use the left and right ENCODER SELECT buttons to navigate through the available SDE24 Encoders and EH24 settings. The selection of the desired parameters for the selected encoder or EH24 can then be made using the LEFT and RIGHT (F2), UP and DOWN (F3), and ENTER (F4) buttons

F6, Ventilation Fan Vents: These are the intake vents for the two ventilation fans. The exhaust vents are on the back of the unit. Do not cover any of these vents as overheating may result.



REAR PANEL CONNECTIONS

R1, RF OUTPUT – This type "F" connector is the high level (+45 to +61 dBmV), 54 to 1002 MHz, output from the EH24 RF output section.

R2, S-VIDEO 1 & 2 - These S-Video type connectors provide two separate S-Video inputs to the SDE24 Encoder.

R3, VIDEO 1 & 2 - These two RCA type connectors color coded yellow provide two separate video inputs to the SDE24 Encoder.

R4, AUDIO 1 & 2 - These four color coded RCA type connectors provide audio **L**eft (white) and **R**ight (red) inputs to the SDE24 Encoder.

R5, This is space available for additional SDE24 Encoders which may be installed in the EH24 Encoder Host.

R6, ASI OUTPUT - This BNC type connector provides ASI output of the multiplexed transport streams from selected encoders.

R7, Cooling Air Vents

R8, RS232 IN - Connection to a PC or modem for use with remote control / monitoring program or for firmware upload.

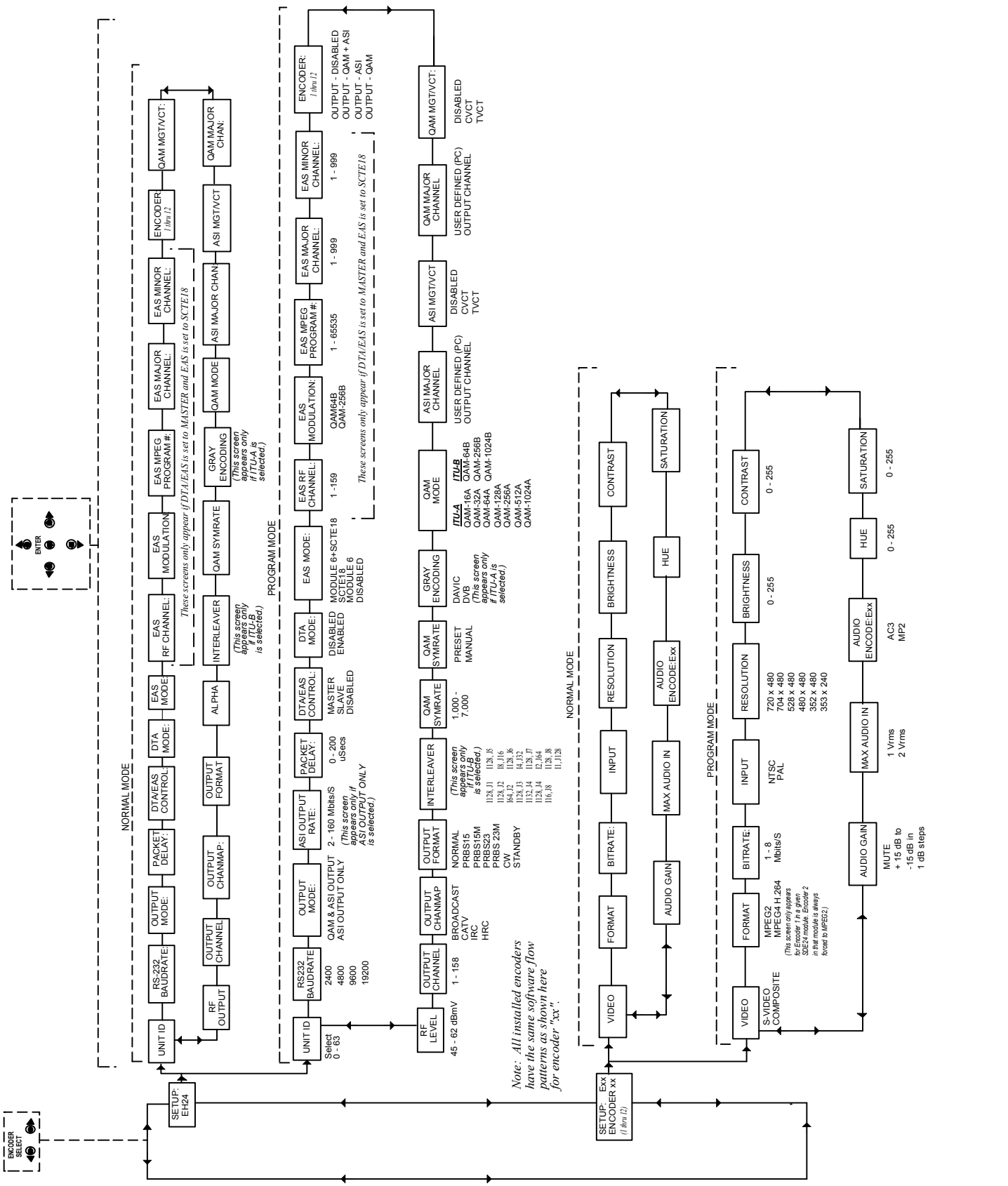
R9, RS232 OUT - Loop to another EH24 or other RS232 controllable device.

R10, AC Line Cord Socket – For connection to the mains AC power source. The removable line cord allows for operation in various countries. Use an appropriate cord for your needs that has been recognized by a certified safety agency. This unit is usually supplied with a cord for USA operation on 120 VAC.

The power supply automatically accepts a mains supply from 90 to 264 VAC, 47 to 63 Hz. Power consumption will vary depending on the number of modules installed but worst case consumption is 70 W.

R11, EAS - This terminal is used to supply the EH24 with a contact closure when the EAS is activated, as determined by an external EAS controller/receiver. The external EAS controller will supply a contact closure output for connection to the EH24 EAS and GND terminals. Grounding the EAS screw terminal, through the contact closure in the controller, will signal the EH24 that an EAS event has occurred. If EAS has been programmed and the EAS encoder installed, the EH24 will respond appropriately.

EH24 ENCODER HOST & SDE24 ENCODER MODULE SOFTWARE FLOW CHART



Programming and viewing of the various setup and operating parameters is accomplished using the front panel back lit, two line, sixteen character wide LCD along with the two LEFT and RIGHT 'ENCODER SELECT' buttons and the five LEFT, RIGHT, UP, DOWN and ENTER buttons. The name of the parameter is on the top line of the display and the setting value is on the bottom line.

To observe a certain parameter setting without intending to change its value, just use the LEFT and RIGHT ENCODER SELECT buttons and the LEFT and RIGHT arrow buttons to navigate through the menus shown in the software flow chart on the previous page. The current setting for each parameter is shown on the bottom line of the display. Note that depending upon certain settings, some screens are not needed and will be skipped.

To make a change in the displayed parameter and its setting and if this is the initial setup, you will want to enter the 'program' mode. To do this, press the ENTER button that is located in the center of the four arrow buttons and hold in for several seconds until the bottom line of the display begins to flash.

After you are in the program mode (bottom line of screen flashing) use the LEFT and RIGHT arrows to navigate among screens and use the UP and DOWN arrows to change the parameter setting. When ENTER is pressed, the new settings will be loaded and stored and the unit will exit the 'program' mode. You may wish to not press ENTER until you have gone through all screens and settings and then press ENTER to save and load all changes in one step, OR you can store just one or several parameters at a time and reenter program mode to set the next. Either method is acceptable.

This section provides additional details regarding the selectable items shown in the 'program' mode on the Software Flow Chart on page 9.

SETUP: EH24

UNIT ID: Select the desired unit identification number when connecting the 'RS232 IN' connector to a PC or modem for remote control using 'Drake Remote Control Software'. Numbers 1 thru 63 may be used. If zero (0) is selected, the PC will ignore the unit.

RS232 BAUD RATE: This setting determines the baud rate at which the EH24 communicates with the remote PC. Settings available are 2400, 4800, 9600 and 19,200. All units 'daisy chained' to the remote PC or modem must be set to the same baud rate.

OUTPUT MODE: This menu provides a means to determine whether the EH24 output should be QAM and ASI or ASI output only.

PACKET DELAY: This menu allows the user to determine the packet delay. The choices are 0 to 200 microseconds. A good default value is usually 50 uS. If pixelization is seen in some programs, the delay may need to be increased. Increase in small iincrements as too much delay can cause a buffer overflow - this will be indicated in the front panel LCD.

DTA/EAS CONTROL: The DTA control is used when EH24s are used to supply the QAM signals to DTA set top boxes. It allows for an ASI stream, generated by a PC to be input to the headend's Master EH24. This control allows for generating a transport stream that provides a virtual channel map to the DTAs (Known as SCTE 65 tables), and/or provides code updated to the DTA's (in a format known as DSM-CC) so that they can be updated through the QAM channel transport stream. The choices are DISABLED, MASTER, and SLAVE.

DTA MODE: This menu choice allows the user to activate or deactivate DTA mode. The choices are ENABLE and DISABLE.

EAS MODE: EAS Control is provided by 1 of 2 methods:

Method 1: - By using the new SDE24EAS module. This module has only a single composite input instead of the 2 inputs of a standard SDE24. It is fed by an external EAS Controller source, that then is encoded by both encoders in the modified SDE24. When EAS is activated, the transport stream generated by the SDE24EAS is routed internally in the EH24 and replaces the transport streams coming from the other plugged in SDE24s. This way all MPEG programs coming out of the EH24 have the EAS video and audio on them. Note that when using this method only 1 SDE24EAS is required per headend, and is placed into the Module 6 slot of the Master EH24.

Method 2: By using the newer digital standard for EAS (known as SCTE 18). In this mode, rather than each MPEG program being replaced by the EAS video, instead when the EAS is activated, a table is inserted into the transport stream. This table tells any SCTE 18 capable unit which RF channel to switch to and which MPEG program number to begin decoding. The receiving unit then switches to that program to display the EAS video and audio. When the EAS is deactivated, the receiving unit returns to its original channel.

The EAS MODE menu allows the user to select which EAS mode is desired. The choices are DISABLED, MODULE 6, SCTE 18, and MODULE 6 + SCTE 18.

EAS RF CHANNEL: This menu allows the user to determine on which RF channel EAS information will be outputted. *Note that this menu will only appear if DTA/EAS is set to MASTER and EAS MODE is set to enable SCTE18.* The choices are 2 through 158.

EAS MODULATION: *Note that this menu will only appear if DTA/EAS is set to MASTER and EAS MODE is set to enable SCTE18.* This menu allows the user to determine the type of modulation to be used for the EAS information. The choices are QAM64B or QAM256B.

EAS MPEG PROGRAM #: *Note that this menu will only appear if DTA/EAS is set to MASTER and EAS MODE is set to enable SCTE18.* This menu allows the user to determine on which MPEG program number the EAS information will appear. The choices are 1 thru 65535.

EAS MAJOR CHANNEL: *Note that this menu will only appear if DTA/EAS is set to MASTER and EAS MODE is set to enable SCTE18.* This menu allows the user to select on which major channel the EAS information will appear. The choices are 1 through 999.

EAS MINOR CHANNEL: *Note that this menu will only appear if DTA/EAS is set to MASTER and EAS MODE is set to enable SCTE18.* This menu allows the user to determine the minor channel number on which the EAS information will appear. The choices are through 999.

ENCODER *1 THRU 12*: These menu items provide the means for selecting the desired output mode of operation for each of the installed encoders. The available settings are DISABLED, QAM + ASI, ASI, and QAM.

QAM MGT/VCT: This menu item provides a means for the user to select either CVCT or TVCT tables or DISABLED for QAM operation. TVCT is the typical setting.

QAM MAJOR CHANNEL: The user may use this menu entry to define the QAM major channel number. The choices are OUTPUT CHANNEL or USER DEFINED using an external PC with Drake Digital Headend Remote Control Software.

ASI MGT/VCT: This menu item provides a means for the user to select either CVCT or TVCT tables or DISABLED for ASI operation.

ASI MAJOR CHANNEL: The user may use this menu entry to define the ASI major channel number. The choices are OUTPUT CHANNEL or USER DEFINED using an external PC with Drake Digital Headend Remote Control Software.

QAM MODE: This menu allows the user to set the modulation type for the output. Choices range from QAM-16A through QAM-1024B. 'A' suffixes indicate DVB compliant FEC and the B suffixes indicate DigiCipher II FEC encoding. Note that the output QAM mode usually must be QAM-256. For CATV systems using DigiCipher II, select the QAM-256B mode. For DISH Network QAM distribution or other DVB systems using DVB set tops, choose the QAM-256A mode.

GRAY ENCODING: This menu is only available when QAM modes QAM-16A through QAM-1024A, are selected. The choices are DVB and DAVIC. Gray Encoding is normally not used for video data.

QAM SYMRATE: Preset or Manual: If PRESET is selected, the symbol rate will be automatically set to the 'normal' rate based on the QAM mode that is selected and assuming a 6 MHz wide QAM channel. If MANUAL is selected, pressing the right or left arrow buttons will allow selection of symrates from 1.000 thru 7.000 MSym/Sec.

QAM SYMRATE: This menu item only appears of 'Manual' is selected in the previously described menu item. It allows selection of the output QAM baudrate or symbol rate. Set as required by the set top box.

INTERLEAVER: This menu item only appears if QAM-64B, QAM-256B, or QAM-1024B is selected and provides the means to set the QAM modulator interleaver. Choose among the available selections based upon your system / set top box requirements. For typical 256-QAM DigiCipher II CATV systems, I128, J1 is the most commonly used interleave setting but many other choices are available. This menu does not appear in the adjust mode if the QAM mode is A (DVB) as there is only one choice in the DVB standard.

OUTPUT FORMAT: For normal operation, select NORMAL. For system level set up, choose CW to provide a CW carrier at the center frequency of the output channel for use in leveling a system when a QAM power meter is not available. To disable all RF output, select STANDBY. In the CW mode, the CW carrier can be measured on a spectrum analyzer without a need to apply a bandwidth correction or it can be measured with an analog meter tuned to channel center. The CW power measured will equal the channel QAM power when the modulator is returned to NORMAL output mode. Usually QAM signals are set 5 dB to 10 dB below analog NTSC channels when balancing a system.

PRBS menu entries are used for testing purposes only and should normally not be selected by the user.

OUTPUT CHANMAP, OUTPUT CHANNEL: Select the desired EIA CATV channel output using these two menus.

RF LEVEL: Select the desired RF output signal level. The available range is between +45 dBmV and +56 dBmV, selectable in 0.5 dB steps. The output accuracy is ± 1 dB.

SETUP: ENDODER xx
ENCODER SELECT: The LEFT and RIGHT buttons allow the user to scroll through the encoder numbers for each encoder installed in the EH24 as well as the EH24 itself. Use the LEFT and RIGHT buttons to select the encoder to be programmed.

VIDEO: This menu entry allows the user to select between S-VIDEO and COMPOSITE video input for each selected encoder.

FORMAT: Either MPEG2 or MPEG4 H.264 may be selected as the output format for the selected encoder using this menu item. Encoder 2 on a given SDE24 has no option. It is forced to MPEG2.

BITRATE: This menu item allows the user to select the bitrate . The choices are from 1 to 8 Mbits per second.

INPUT: This menu allows the user to select between the NTSC or PAL video formats.

RESOLUTION: The resolution of the video output of each encoder may be selected from this menu item. The choices range from 720 x 480 thru 353 x 240 as shown on the software flow chart on page 9.

BRIGHTNESS, CONTRAST, SATURATION and HUE: These menu items allow the user to assign each of these parameters of the output video values from 0 to 255.

AUDIO ENCODER: The SDE24 includes audio encoders for Dolby Digital Stereo commercial encoding (AC3) or MPEG1 Layer 2 audio encoding (MP2). In the USA, the majority of applications will use AC3 but if your network is using Annex A (DVB) set top boxes, they may require the MPEG audio selection. Some TVs and set top boxes will decode either mode but be sure to set the encoder to the mode used by other programming on your system to insure complete compatibility. The AUDIO ENCODE(R) menu allows you to select either AC3 or MP2. Use the up/dn arrow keys to toggle between the two settings.

MAX AUDIO IN: This menu entry allows the user to set the maximum audio input which may be input to the selected encoder. The choices are 1 Vrms or 2 Vrms.

AUDIO GAIN: The audio output level can be chosen from this menu item by selection of the appropriate gain. The values range from + 15 dB to - 15 dB. Audio output can also be completely eliminated using the 'MUTE' selection.

OPERATING INSTRUCTIONS – FROM THE FRONT PANEL

1) Connect video and audio inputs to desired encoder modules. Note, as viewed from the rear, the number 1 program will be on the left, the one closest to the RF output connector. The number 2 program will be the next input to the right.

2) Connect the outputs as desired.

3) Plug the EH24 into AC power. Allow 30 to 90 seconds for boot-up.

4) From the front panel, use the ENCODER SELECT buttons to choose among EH24 settings and settings for each encoder. Use the ENTER button to enter program mode and to save settings in memory. Use left and right arrows to select a parameter and then use the up or down arrows to change its value. Parameters values can only be changed when the unit is in the program mode as indicated by slow flashing of the front panel display. To enter program mode, press the ENTER key and hold for 2 to 3 seconds.

5) Press ENTER for 3 seconds to enter program mode.

6) Repeatedly press the ENCODER SELECT right or left arrow until the display shows: SETUP EH24.

7) Repeatedly press the left or right arrows (on either side of the enter button) until the display reads ENCODER1. Press up or down arrows to select which output or both outputs that this encoder is to output to. Then press the right arrow once to advance to ENCODER 2. Choose output for this one. Proceed in this manner until all encoders have been directed to the desired outputs. ENCODERs 1 and 2 will be the first module, 3 and 4 the second module, 11 and 12 the sixth module, etc. If an encoder is installed but you don't plan to use it, be sure to choose the DISABLED choice for any such encoders.

8) Press the right arrow again after setting the 12 th encoder. This should produce the QAM MGT/VCT screen. Usually select TVCT by using up or down arrows.

9) Press right arrow again and observe the QAM MODE screen. Use up or down arrows to select QAM mode. For example, QAM-256B would select 256 QAM with annex B FEC (DigiCipher FEC).

10) Press right arrow again and observe QAM SYMRATE. Set to PRESET. PRESET will be 5.057 MS/S for QAM-64B or 5.3606 MS/S for QAM-256B, etc. If a nonstandard rate is desired, choose MANUAL.

11) Press right arrow again and observe INTERLEAVER. Select I128,J1 unless you have a special requirement.

12) Press right arrow again and move to the OUTPUT FORMAT. Choose NORMAL. For testing/level setup – temporarily choose CW to produce a CW carrier in the center of the channel. Other PRBS choices are for testing only.

13) Press right arrow again and observe OUTPUT CHANMAP. Select the desired plan, usually CATV.

14) Press right arrow and observe OUTPUT CHANNEL. Select desired channel. The RF channel number being set will be used as the major channel number in the output stream.

15) Press right arrow and observe RF OUT. Choose desired RF out level.

16) Press right arrow and observe UNIT ID. If not using RS232 remote control, choose 0.

17) Press the right arrow and observe RS232 BAUDRATE. Set to 4800 unless otherwise directed.

18) Press the right arrow and observe that you are back to the ENCODER 1 screen.

At this point, you can press ENTER to store all of the above choices. Actually, you could store after setting just one item or after two items, etc. But once you store a parameter(s), you must renter the program mode to make any additional adjustments.

All of the above settings can be set using a PC connected via the RS232 port or through an Ethernet connection via the DRAKE model SCTeci unit.

Having completed EH24 settings, above, you are now ready to setup each individual encoder.

19) Press ENTER for 3 seconds to enter program mode. Observe flashing display.

20) Use left or right ENCODER SELECT buttons to choose one of the installed encoders.

21) To set the encoder to typical default settings, press the up arrow, down arrow, and ENTER all at the same time. Hold the three buttons in for several seconds and release.

22) If any of the encoder settings need changed from the default values, re-enter program mode and adjust each encoder parameter as required.

23) Repeat from step 19 for each enabled encoder.

24) Press ENTER to store any unsaved changes.

Operating Instructions - From Drake Digital Headend Control Program

1) Confirm that all connections to the EH24 and its installed encoder modules have been made as described previously. Connect a serial cable from the RS232 IN connector on the EH24 to the serial port on the PC. (This discussion assumes that the Headend Control Program has already been installed on the PC as per the instructions supplied with the software.)

2) Activate the software. You should see a screen similar to **FIGURE 1** at right.

FIGURE 1

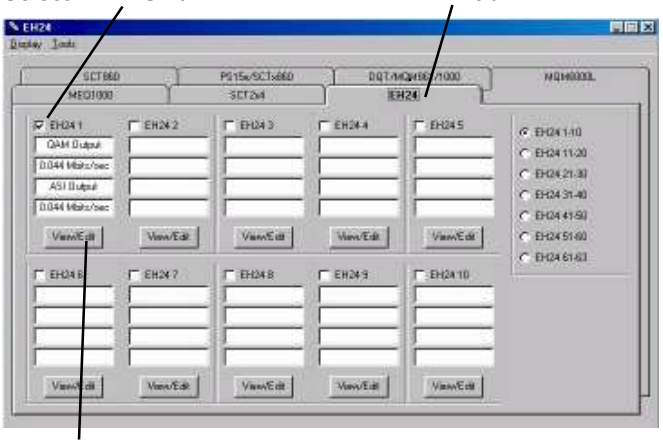
3) Click on the 'Setup New Headend' button. This will bring up the screen shown in **FIGURE 2.** Type in the name of the headend in the 'HeadEnd Name' field and click on 'OK'. In this case we have typed in EH24. Then select the 'PC Baudrate' and 'Using Port'. If you intend to use a modem instead of a direct connection, make that selection using the 'Connect via:' radio buttons, and type in the phone number of the desired modem in the 'Number to dial' window. Then click 'OK'.

FIGURE 2

4) You will be presented with a screen similar to the one shown on **FIGURE 3**. Click on the EH24 tab, and click on the box representing the EH24 unit ID of the unit you are programming. In this example we selected Unit ID #1. Then click on the 'View Edit' button.

Select EH24 Unit ID

EH24 Tab



View/Edit Button

FIGURE 3

This will bring up the screen shown in **FIGURE 4**. Click on the Encoders tab and select the number of the encoder you choose to program. Set each parameter to the desired value. Select the number of the next encoder and set each of its parameters. Repeat for each encoder which you desire to program. Note that if the value of the parameter selected in the left column differs from the value of that parameter in the selected encoder in the EH24 shown in the right column, that value will appear in red.

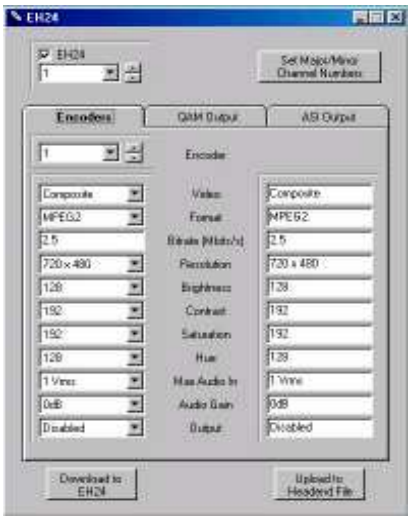


FIGURE 4

5) Click on the 'QAM Output' tab and set each parameter using the same technique used when setting encoder parameters.

6) Click on the 'ASI Output' tab and set its values to the desired values as using the same techniques as above.

7) Click on the 'Set Major/Minor Channel Numbers' button. You will be presented with a screen shown in **FIGURE 5**.

8) This screen allows the user to reasign MPEG numbers as well as new major and minor channel numbers.

9) Once the selections have been made, click on the 'Download to EH24' button. This will transfer all selections on this screen as well as all selections made on the previous screens to the EH24 and its installed SDE24 modules. Close this screen by clicking on the 'X' in the upper right hand corner of the screen.

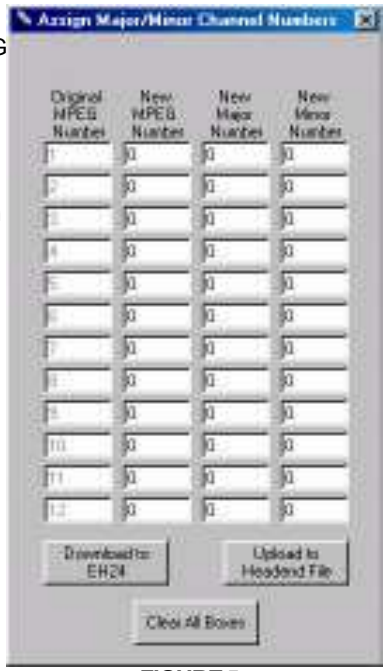


FIGURE 5

10) You will note that all of the items in the right hand columns in the Encoders, QAM Output and ASI output screens are now black and agree with the selections made in the left hand columns.

11) Additional information on the operation of the Drake Digital Headend Control Program can be found in the instructions included on the program CD.

ADDITIONAL INFORMATION

STANDBY MODE

The EH24 has a standby output mode which turns off the RF output. This can be used when it is desirable to temporarily disable the output without unplugging the AC line cord. Select DISABLED in the 'QAM MGT/VCT' menu. Individual encoders can be disabled or enabled when in the QAM mode from the 'ENCODER xx' menu.

OVER TEMPERATURE SENSOR

Temperature monitoring is built into this product. If inadequate ventilation is provided, overheating may occur. If this condition is detected, the default LCD message will change to OVER TEMP. If this occurs, the problem should be corrected as soon as possible. The unit will remain operational but the ventilation must be restored to prevent premature part failures due to overheating.

STATUS DISPLAYS

When the units are not in the program mode, status displays are shown. The default display shows the QAM OUTPUT Mbits/S. When the UP button is pressed, the version number of the EH24 firmware is displayed. The DOWN button toggles the display between QAM OUTPUT Mbits/S and ASI OUTPUT Mbits/S.

REMOTE CONTROL AND MONITORING

The EH24 may be used with the 'Drake Digital Headend Remote Control Software' program to allow remote monitoring or control. Only version 3.0 or newer version of the software is compatible with the EH24.

Connect the RS232 cable coming from the PC or modem to the RS232 IN DB9 rear panel connector.

Assign a UNIT ID (1 to 63) to use the remote program. Leave at, or set to, 0 if no remote access is desired.

Set the RS232 BAUD RATE to match the PC setting.

If you are familiar with the Drake Software Program, operation will be clear. If not familiar with it, see further instructions in the insert provided with the CDROM or stored on the CDROM.

EAS CONSIDERATIONS

Any headend using EAS and/or DTAs that includes more than one EH24 must be setup with one EH24 being the Master and all other EH24s being Slaves.

These setups require different configurations of the EH24 with the SDE24EAS and ASII plug in modules.

-If set as a Slave Unit, Module 6 must always be an ASII module.

-If set as the Master unit, then there are 4 possible configurations for what needs to be plugged into the Module 6 and the Module 5 slots.

DTA MODE	EAS MODE	Module 6 Plug-in	Module 5 Plug-in
DISABLED	SCTE 18	SDE24 or empty	SDE24 or empty
DISABLED	MODULE 6	SDE24EAS	SDE24 or empty
DISABLED	MODULE 6 + SCTE 18	SDE24EAS	SDE24 or empty
ENABLED	DISABLED or SCTE 18	ASII	SDE24 or empty
ENABLED	MODULE 6	SDE24EAS	ASII
ENABLED	MODULE 6 + SCTE 18	SDE24EAS	ASII

As shown above, if DTA MODE is ENABLED, then an ASII module must be present in the Master EH24 to receive the ASI stream from the PC. Whether it is plugged into Module 5 or Module 6 slot depends on whether the SDE24EAS is also required in the system or not.

All units at the headend are then daisy-chained through ASI connections.

The Master unit's ASI OUTPUT connector goes to the ASI INPUT connector of the ASII module in the first Slave unit.

The ASI LOOP output connector of the ASII module in the first Slave unit goes to the ASI INPUT connector of the ASI module in the next slave unit.

These ASI LOOPs continue through all EH24s at the headend.

There can be standard SDE24s in some or all of the remaining slots of the Master EH24. If they are wanted to be sent out on the ASI output of the Master EH24 can be picked up from the ASI LOOP output connector of the ASII module of the last Slave unit in the chain.

VERY IMPORTANT...When the SDE24EAS is used in slot 6, both encoders in the SDE24EAS must be set to the lowest encoding bitrate of any other SDE24 in the entire system. This is the only way to make sure that when its stream replaces the original streams that it will still fit into all the QAM channels.

TABLE 1: **CATV**

CABLE TV CHANNELS	
Channel Number	*Center of Channel*
EIA/NCTA Numeric Equivalent	Frequency in MHz
2	57
3	63
4	69
5	79
6	85
95	93
96	99
97	105
98	111
99	117
14	123
15	129
16	135
17	141
18	147
19	153
20	159
21	165
22	171
7	177
8	183
9	189
10	195
11	201
12	207
13	213
23	219
24	225
25	231
26	237
27	243
28	249
29	255
30	261
31	267
32	273
33	279
34	285
35	291
36	297
37	303
38	309
39	315
40	321

CABLE TV CHANNELS	
Channel Number	*Center of Channel*
EIA/NCTA Numeric Equivalent	Frequency in MHz
41	327
42	333
43	339
44	345
45	351
46	357
47	363
48	369
49	375
50	381
51	387
52	393
53	399
54	405
55	411
56	417
57	423
58	429
59	435
60	441
61	447
62	453
63	459
64	465
65	471
66	477
67	483
68	489
69	495
70	501
71	507
72	513
73	519
74	525
75	531
76	537
77	543
78	549
79	555
80	561
81	567
82	573
83	579
84	585
85	591

CABLE TV CHANNELS	
Channel Number	*Center of Channel*
EIA/NCTA Numeric Equivalent	Frequency in MHz
86	597
87	603
88	609
89	615
90	621
91	627
92	633
93	639
94	645
100	651
101	657
102	663
103	669
104	675
105	681
106	687
107	693
108	699
109	705
110	711
111	717
112	723
113	729
114	735
115	741
116	747
117	753
118	759
119	765
120	771
121	777
122	783
123	789
124	795
125	801
126	807
127	813
128	819
129	825
130	831
131	837
132	843
133	849
134	855
135	861

CABLE TV CHANNELS	
Channel Number	*Center of Channel*
EIA/NCTA Numeric Equivalent	Frequency in MHz
136	867
137	873
138	879
139	885
140	891
141	897
142	903
143	909
144	915
145	921
146	927
147	933
148	939
149	945
150	951
151	957
152	963
153	969
154	975
155	981
156	987
157	993
158	999

TABLE 2: BC TV

VHF BROADCAST CHANNELS	
Channel Number	*Center of Channel Frequency (MHz)*
2	57
3	63
4	69
5	79
6	85
7	177
8	183
9	189
10	195
11	201
12	207
13	213

UHF BROADCAST CHANNELS	
Channel Number	*Center of Channel Frequency (MHz)*
14	473
15	479
16	485
17	491
18	497
19	503
20	509
21	515
22	521
23	527
24	533
25	539
26	545
27	551
28	557
29	563
30	569
31	575
32	581
33	587
34	593
35	599
36	605
37	611
38	617
39	623
40	629
41	635
42	641
43	647
44	653
45	659
46	665
47	671
48	677
49	683
50	689
51	695
52	701
53	707
54	713
55	719
56	725
57	731
58	737
59	743
60	749
61	755
62	761
63	767
64	773
65	779
66	785
67	791
68	797
69	803

SERVICE INFORMATION
You may contact the R.L. DRAKE Service Department for additional information or assistance by calling +1 (937) 746-6990, Monday through Friday, between 8:00 A.M. and 4:00 P.M. Eastern Time, except on holidays.

You may also contact the R.L. DRAKE Service Department by E-mail at the following address:
TechSupport@rldrake.com
or by Telefax:
+1 (937) 806-1576.

Should you want to return your unit for service, package the unit carefully using the original carton or other suitable container.

Write your return address clearly on the shipping carton and on an enclosed cover letter describing the service required, symptoms or problems. Also include your daytime telephone number and a copy of your proof of purchase.

The unit will be serviced under the terms of the R.L. DRAKE LLC Limited Warranty and returned to you.

IF YOU NEED TO CALL FOR HELP
Call our Customer Service/Technical Support line at +1 (937) 746-6990 between 8:00 A.M. and 4:00 P.M. Eastern Time, weekdays. Please have the unit's serial number available. We will also need to know the specifics of any other equipment connected to the unit.
When calling, please have the unit up and running, near the phone if possible. Our technician(s) will likely ask certain questions to aid in diagnosis of the problem. Also, have a voltmeter handy, if possible.

R.L. DRAKE also provides technical assistance by e-mail: TechSupport@rldrake.com
or by Telefax: +1 (937) 806-1576.

Many of the products that are sent to us for repair are in perfect working order when we receive them. For these units, there is a standard checkout fee that you will be charged. Please perform whatever steps are applicable from the installation sections of the Owner's Manual before calling or writing—this could save unnecessary phone charges. Please do not return the unit without contacting R.L. DRAKE first: it is preferred to help troubleshoot the problem over the phone (or by mail) first, saving you both time and money.

Inside the carton, enclose a note with your name, address, daytime phone number, and a description of the unit's problem.
The unit must be sent to the following address:

Service Department
R.L. DRAKE LLC
230 Industrial Drive
Franklin, Ohio 45005 U.S.A.

Be sure to include your street address which will be needed for UPS return. UPS Surface (Brown Label) takes 7-10 days to reach us depending on your location, Blue takes 2-3 days.

Red is an overnight service. Send the unit in a way that it can be traced if we can't verify receipt of shipment. We suggest UPS or insured postal shipment.

If the unit is still under the original owner's warranty, R.L. DRAKE will pay the cost of the return shipment to you. Our return shipping policy is that we will return it UPS Brown if received Brown or by US Mail, it will be returned Blue if received Blue or Red—or it will be returned however you prefer if you furnish the return cost for the method you select.

If the unit is out of warranty, use one of the following methods for return shipment:

1) You designate billing to American Express, VISA, MasterCard or Discover card;
2) You prepay the service charges with a personal check, or
3) You specify some other method of return and payment.

When calling, the technician can estimate the repair charges for you over the phone. This is another good reason to call before sending a unit in for repair. Typically, equipment is repaired in five to ten working days after it arrives at R.L. DRAKE if we have all the facts. If we must call you, it may take longer. R.L. DRAKE is not responsible for damage caused by lightning, nonprofessional alterations, "acts of God", shipping damage, poor storage/handling, etc. R.L. DRAKE will make note of any shipping damage upon receipt.

You will need to send proof of purchase to receive warranty service. Typically, a copy of the invoice from an R.L. DRAKE dealer will suffice. The warranty is for the original owner only and is not transferable.

Three Year Limited Warranty

R.L. DRAKE LLC warrants to the original purchaser this product shall be free from defects in material or workmanship for three (3) years from the date of original purchase.

During the warranty period the R.L. DRAKE LLC or an authorized Drake service facility will provide, free of charge, both parts and labor necessary to correct defects in material and workmanship. At its option, R.L. DRAKE LLC may replace a defective unit.

To obtain such a warranty service, the original purchaser must:

(1) Retain invoice or original proof of purchase to establish the start of the warranty period.

(2) Notify the R.L. DRAKE LLC or the nearest authorized service facility, as soon as possible after discovery of a possible defect, of:
(a) the model and serial number,
(b) the identity of the seller and the approximate date of purchase; and
(c) A detailed description of the problem, including details on the electrical connection to associated equipment and the list of such equipment.

(3) Deliver the product to the R.L. DRAKE LLC or the nearest authorized service facility, or ship the same in its original container or equivalent, fully insured and shipping charges prepaid.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore carefully read the Instruction Manual. This warranty does not apply to any defect that R.L. DRAKE LLC determines is due to:

(1) Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.

(2) Misuse, abuse, neglect or improper installation.

(3) Accidental or intentional damage.

All implied warranties, if any, including warranties of merchantability and fitness for a particular purpose, terminate three (3) years from the date of the original purchase.

The foregoing constitutes R.L. DRAKE LLC'S entire obligation with respect to this product, and the original purchaser shall have no other remedy and no claim for incidental or consequential damages, losses or expenses. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusions or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state. This warranty shall be construed under the laws of Ohio.

For Service, contact:

Superior Transmitters
17194 Preston Rd. Suite 102-297, Dallas, TX 75428
Tel: 972-473-2577 | Email: jjsbp@msn.com
www.sbp-tv.com

Superior Broadcast, where the Best Cost Less
Call us today. We want to talk to You

Superior Broadcast
18208 Preston Rd, Suite D9-297, Dallas, TX 75252
Tel: 972-473-2577 | Email: jjsbp@msn.com
www.sbp-tv.com

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Superior Broadcast

Jimmie Joynt
Tel: 972-473-2577 | Email: jjsbp@msn.com

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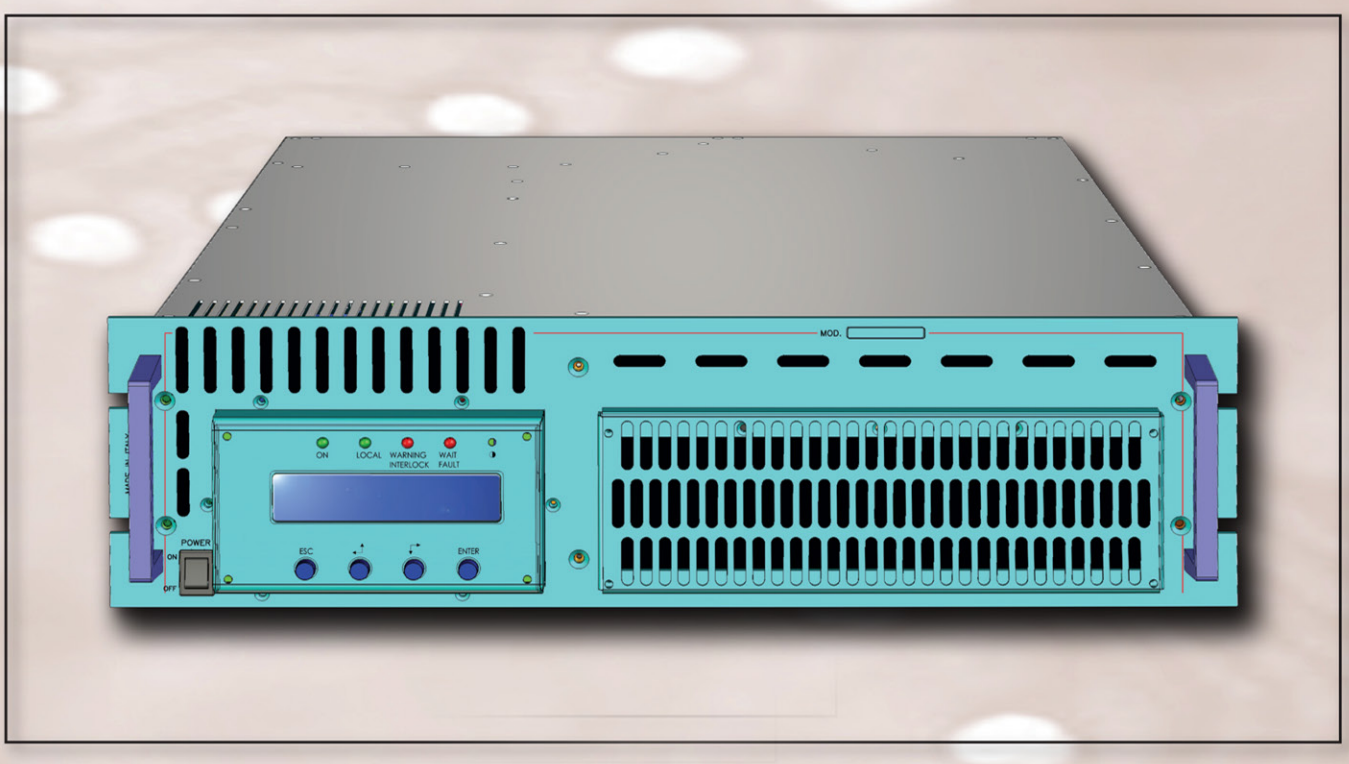
Superior Broadcast

ATVCA 500 W Amplifier

USER MANUAL



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Superior Broadcast

Jimmie Joynt
Tel: 972-473-2577 | Email: jjsbp@msn.com

18208 Preston Rd. Suite D9-297, Dallas, TX 75252. www.sbp-tv.com

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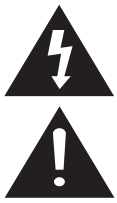
IMPORTANT



The lightning flash with arrowhead, within a triangle, is intended to alert the user of the presence of dangerous voltage that may constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment.

1. Preliminary Instructions

• General foreword The equipment in object is to considering for uses, installation and maintenance from “trained” or “qualified” staff, they conscious of the risks connected to operate on electronic and electrical circuits electrical.

The “trained” definition means staff with technical knowledge about the use of the equipment and with responsibility regarding the own safety and the other not qualified staff safety place under his directed surveillance in case of works on the equipment. The “qualified” definition means staff with instruction and experience about the use of the equipment and with responsibility regarding the own safety and the other not qualified staff safety place under his directed surveillance in case of works on the equipment.

WARNING: The machine can be equipped with an ON/OFF switch which could not remove completely voltages inside the machine. It is necessary to have disconnected the feeding cord, or to have switched off the control panel, before to execute technical operations, making sure himself that the safety connection to ground is connected. The technical interventions that expect the equipment inspection with circuits under voltage must be carry out from trained and qualified staff in presence of a second trained person that it is ready to intervene removing voltage in case of need.

Superior Broadcast doesn’t assume responsibility for injury or damage resulting from improper procedures or practices by untrained/unqualified personnel in the handling of this unit.

WARNING: The equipment is not water resistant and an infiltration could seriously compromise its correct operation. In order to prevent fires or electric shocks, do not expose the equipment to rain, infiltrations or humidity.

Please observe all local codes and fire protection standards during installation and use of this unit.

WARNING: The equipment has to its inside exposed parts to risk of electric shock, always disconnect power before opening covers or removing any part of this unit.

Fissures and holes are supplied for the ventilation in order to assure a reliable efficacy of the product that for protect itself from excessive heating, these fissures do not have to be obstructed or to be covered. The fissures doesn’t be obstructed in no case. The product must not be incorporated in a rack, unless it is supplied with a suitable ventilation or that the manufacturer’s instructions are been followed.

WIRING: This equipment can irradiate radio frequency energyand if it’s not installed following the instructions contained in the manual and local regulations it could generate interferences in radio communications

WIRING: This device has a connection to ground on the power cord and on the chassis. Check that they are correctly connected.

Operate with this device in a residential ambient can cause radio disturbs; in this case, it can be demanded to the user to take adequate measures. Specifications and informations contained in this manual are furnished for information only, and are subject to change at any time without notice, and should not be construed as a commitment by **Superior Broadcast.**

The Superior Broadcast assumes no responsability or liability for any errors or inaccuracies that may appear in this manual, including the products and software described in it;and it reserves the right to modify the design and/or the technical specifications of the product and this manual without notice.

• Warning regarding the use designated and the use limitations of the product.

This product is an transmitter radio indicated for the audio broadcasting service in frequency modulation. It uses working frequencies that are not harmonized in the states of designated user. The user of this product must obtain from the Authority for spectrum management in the state of designated user the appropriate authorization to use the radio spectrum, before putting in exercise this equipment. The working frequency, the transmitter power, let alone other specifications of the transmission system are subject to limitation and definited in the authorization obtained.

2. Warranty

Superior Broadcast guarantees absence of manufacturing defect and the good operation for the products, within the provided terms and conditions. Please read the terms carefully, because the purchase of the product or acceptance of order confirmation, constitutes acceptance of the terms and conditions. For the last legal terms and conditions, please visit our web site www.sbp-tv.com) wich may also be changed, removed or updated for any reason without prior notice. Warranty will be void in cases of opened products, physical damage, misuse, modification, repair by unauthorised persons, carelessness and using the product for other purpose than its intended use. In case of defect, proceed like described in the following:

1. Contact the dealer or distributor where you purchased the unit. Describe the problem and, so that a possible easy solution can be detected.

Dealers and Distributors are supplied with all the information about problems that may occur and usually they can repair the unit quicker than what the manufacturer could do. Very often installing errors are discovered by dealers.

2. If your dealer cannot help you, contact **Superior Broadcast** and explain the problem. If it is decided to return the unit to the factory, **Superior Broadcast** will mail you a regular authorization with all the necessary instructions to send back the goods;

3. When you receive the authorization, you can return the unit. Pack it carefully for the shipment, preferably using the original packing and seal the package perfectly. The customer always assumes the risks of loss (i.e.,

Superior Broadcast. is never responsible for damage or loss), until the package reaches R.V.R. premises. For this reason, we suggest you to insure the goods for the whole value. Shipment must be effected C.I.F. (PREPAID) to the address specified by Superior Broadcast's service manager on the authorization

DO NOT RETURN UNITS WITHOUT OUR AUTHORIZATION AS THEY WILL BE REFUSED

4 Be sure to enclose a written technical report where mention all the problems found and a copy of your original invoice establishing the starting date of the warranty.

Replacement and warranty parts may be ordered from the following address. Be sure to include the equipment model and serial number as well as part description and part number.

Superior Broadcast
18208 Preston Rd, Suite D9-297
Dallas, TX 75252
Tel: 972-473-2577

3. First Aid

The personnel employed in the installation, use and maintenance of the device, shall be familiar with theory and practice of first aid.

3.1 Treatment of electrical shocks

3.1.1 If the victim is not responsive

Follow the A-B-C's of basic life support.

- Place victim flat on his backon a hard surface.
- Open airway: lift up neck, push forehead back

(Figure 1).

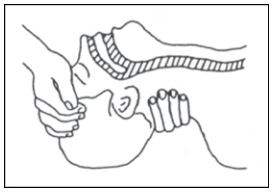


Figure 1

- clear out mouth if necessary and observe for breathing
- if not breathing, begin artificial breathing (Figure 2): tilt head, pinch nostrils, make airtight seal, four quick full breaths

Remember mouth to mouth resuscitation must be commenced as soon as possible.

Figure 2

- Check carotid pulse (Figure 3); if pulse is absent, begin artificial circulation (Figure 4) depressing sternum (Figure 5).

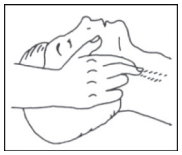


Figure 3

Figure 4

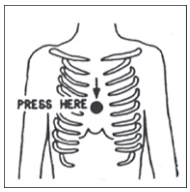


Figure 5

- In case of only one rescuer, 15 compressions alternated to two breaths.
- If there are two rescuers, the rythm shall be of one brath each 5 compressions.
- Do not interrupt the rythm of compressions when the second person is giving breath.
- Call for medical assistance as soon as possible.

3.1.2 If victim is responsive

- Keep them warm.
- Keep them as quiet as possible.
- Loosen their clothing (a reclining position is recommended).
- Call for medical help as soon as possible.

3.2 Treatment of electrical Burns

3.2.1 Extensive burned and broken skin

- Cover area with clean sheet or cloth.
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated.

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold).

Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes.

Discontinue fluid if vomiting occurs.

DO NOT give alcohol.

3.2.2 Less severe burns

- Apply cool (not ice cold) compresses using the cleansed available cloth article.
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment.
- Apply clean dry dressing if necessary.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated.

4. General Description

The **ATVCA** is an **analog TV broadcasting amplifier** manufactured by **R.V.R. Elettronica SpA** delivering up to 1000 W_{PS} under 50 Ohm standard load and less than 100W drive power requirement.

The **ATVCA** has been designed for installation in a 19”x3HE box for rack.

4.1 Unpacking

The package contains:

- 1 **ATVCA**
- 1 User Manual
- 1 Mains power cable

The following accessories are also available from Your R.V.R. Dealer:

- **Accessories, spare parts and cables**

4.2 Features

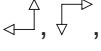
Two major features of **ATVCA** are compact design and user-friendliness. Another key feature is its modular-concept design: the different functions are performed by modules with most connections achieved through male and female connectors or through flat cables terminated by connectors. This design facilitates maintenance and module replacement.

The RF power section uses two moduls amplifier. Each one is able to deliver up to 500Wps.

An LCD on the front panel and a push-button panel provide for user interfacing with the microprocessor control system, which implements the following features:

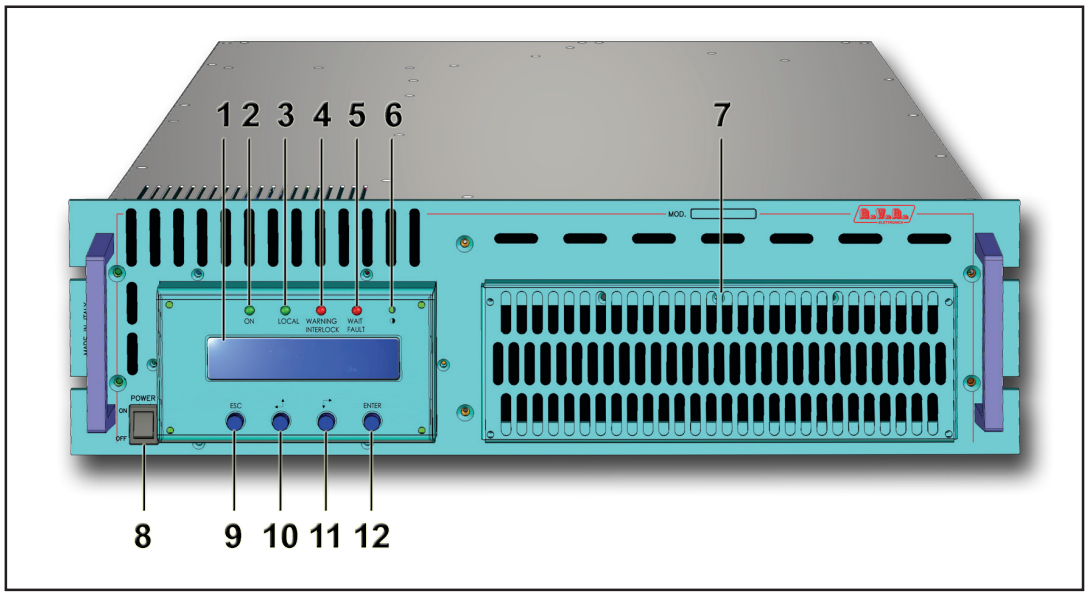
- Power output enable/disable
- User-selectable threshold settings for output power alarm (Power Good feature)
- Measurement and display of amplifier’s operating parameters
- Communication with external devices, as programming systems or telemetry systems through RS232 or I^2C serial interface

Four LEDs on the front panel provide for machine status indication (ON, LOCAL, WARNING INTERLOCK, WAIT FAULT).

The amplifier management software is based on a menu system. User has four navigation buttons available to browse submenus: **ESC**,  , and **ENTER**.

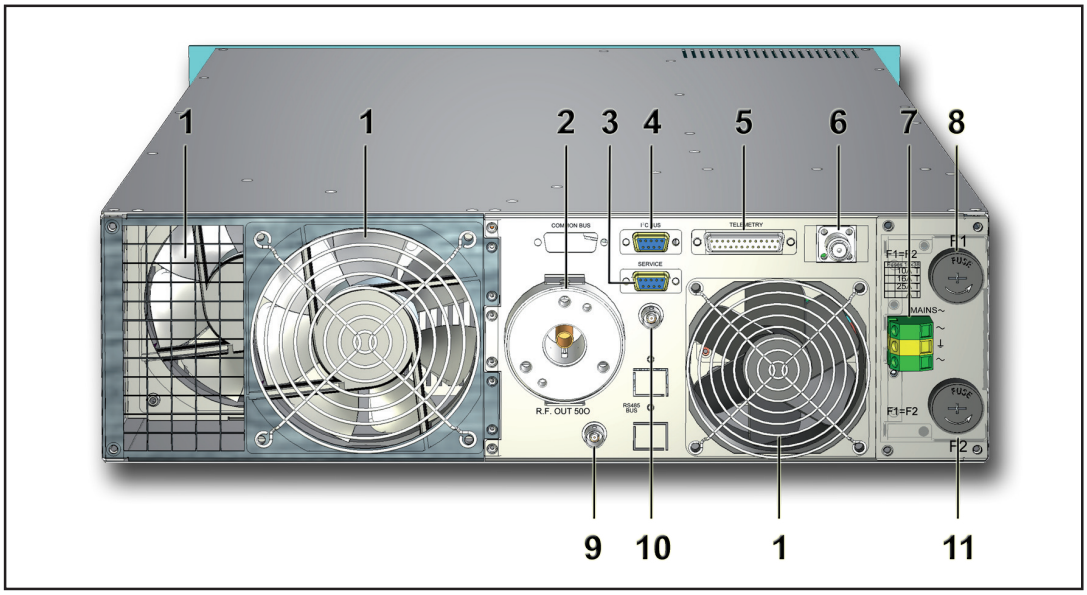
The rear panel features the mains input connectors, RF power input and output connectors, remote connector, protection fuse, interlock input and interlock output connectors and a BNC connector that provides an RF test point with a level suitable to execute the measurement.

4.3 Frontal Panel Description



[1]	DISPLAY	LCD display.
[2]	ON	Green LED: indicates that the amplifier is switched on.
[3]	LOCAL	Yellow LED: indicates that the amplifier is in local control mode.
[4]	WARNING/INTERLOCK	Yellow LED: indicates a condition that doesn't inhibit the output of the transmitter and is reported via GUI and telemetry. Red LED: indicates that the amplifier is switching off. This status is caused by an external condition that is blocking the power output.
[5]	WAIT/FAULT	Yellow LED: indicates a condition that inhibits the output power of the transmitter before attempting to restore, it is reported via GUI, TC/TS and telemetry. Red LED: indicates a fault that cannot be automatically reverted. This condition is generated after 10 restore attempts from WARNING condition, and it can block the machine; it is reported via GUI, TC/TS and telemetry.
[6]	CONTRAST	Trimmer to regulate the contrast of the LCD display.
[7]	AIR FLOW	Grill for the ventilation flow passage.
[8]	POWER	AC mains ON/OFF switch.
[9]	ESC	Button used to exit from a menu.
[10]		Button used to navigate in the menu system and to modify the changeable parameters.
[11]		Button used to navigate in the menu system and to modify the changeable parameters.
[12]	ENTER	Button used to accept a parameter's value or to enter into a menu.

4.4 Rear Panel Description



[1]	AIR FLOW	Grill for the ventilation flow passage
[2]	RF OUT	RF output connector (7/8” EIA flange)
[3]	SERVICE	DB9 connector for interconnection with other devices and factory parameters programming (only for factory programming).
[4]	I²C BUS	DB9 connector for I²C bus networking
[5]	TELEMETRY	DB25 telemetry connector
[6]	RF IN	RF input connector (“N” type)
[7]	MAINS	Mains supply plug, 1230V 50-60 Hz
[8]	FUSE 1	Fuse for mains power supply.
[9]	RF MONITOR	BNC connector for RF monitor output, -60 dB wrt the RF output power level, suitable for modulation monitoring. Not suitable for spectral analysis.
[10]	INTERLOCK OUT	BNC interlock output connector: when the transmitter enters into stand-by mode, the inner conductor, tipically floating, is forced to ground.
[11]	FUSE 2	Fuse for mains power supply.

4.5 Connector Description

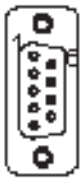
4.5.1 Telemetry Connector

Type: DB25 Female

1	Internal SWR	Disabled
2	RF power amplifier voltage	3,9V x 50V
3	GND	GND
4	Reflected Power	3,9V x 100W
5	Interlock	
6	Set 4	
7	GND	GND
8	“On” Command	
9	Set 1	
10	WAIT	
11	Reset alarm	
12	OFF	
13	Interlock	
14	Temperature	3.9V x 100°
15	RF power amplifier current	3.9V x 60A
16	Forward Power	3,9V x 1000W_{PS}
17	FAULT	
18	Set 3	
19	Input power	3,9V x 0dB
20	“OFF” Command	
21	GND	GND
22	Set 2	
23	LOC	
24	+Vcc	
25	ON	

4.5.2 Service

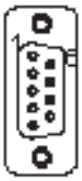
Type: DB9 female



1	NC
2	TX_D
3	RX_D
4	Internally connected with 6
5	GND
6	Internally connected with 4
7	Internally connected with 8
8	Internally connected with 7
9	NC

4.5.3 I²C Connector

Type: DB9 Female



1	NC	
2	SDA	Serial Data
3	SCL	Serial Clock
4	NC	
5	GND	GND
6	NC	
7	NC	
8	NC	
9	NC	

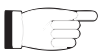
4.6 Technical Description

			ATVCA1K0LU1	
Parameters	*Conditions*	*U.M.*		*Notes*
GENERALS				
Frequency range		MHz	470-860	
Rated output power		W	1000WPS	
Input power for rated output		WPS	0dBm	
Power supply type			monophase/biphase	
AC Supply Voltage	Mains input voltage range	VAC	230 +10% -15%(*)	
DC Supply Voltage	CPU backup Input Voltage	VDC		
AC Apparent Power Consumption		VA	about 2080	Measured on monophase 230V
Active Power Consumption		W	about 2060	Measured on monophase 230V
RF Fan active Power consumption		W	80	Measured on monophase 230V
RF module efficiency		%	59 con red field	Only for PA
Overall efficiency		%	50	Measured on monophase 230V
Input device			5 pushbutton	
Display			Alphanumerical LCD - 2 x 16	
Overall Phisical Dimensions	Front panel width	mm	483 (19")	
	Front panel height	HE	3	
	Overall depth	mm	655	
Ambient working temperature		°C	0 to + 45	
Spurious & harmonic suppression		dBc	In according to output filter	Meets or exceeds all FCC and CCIR rules
RF INPUT				
RF Input	Connector		N type	
	Impedance	Ohm	50	
Driver power for rated output		W	0dBm	
Max input power before protection		W	50	
RF OUTPUTS				
RF Output	Connector		7/8"flange type	
	Impedance	Ohm	50	
RF Monitor	Connector		BNC	
	Impedance	Ohm	50	
	Output Level	dB	approx. -60	Referred to the RF output
AUXILIARY CONNECTIONS				
Interlock Output	Connector		BNC	
RS232 Serial Interface	Connector		DB9F	Factory reserved for firmware program / configuration
Com Bus	Connector		DB15M	Factory reserved for coupling purposes
I²Cbus	Connector		DB9F	
Telemetry Interface	Connector		DB25F	
RS485 Serial Interface	Connector			
Remote Interface	Connector			
AUX power supply	Connector			
POWER REQUIREMENTS				
AC Power Input	AC Supply Voltage	VAC	230 +10% -15%(*)	(*) monophase (**) Threephases Y
	AC Apparent Power Consumption	VA	2080	Measured on monophase 230V
	Active Power Consumption	W	2060	Measured on monophase 230V
	Power Factor		0,99	Measured on monophase 230V
	Connector		Morsettiera	
DC Power Input	DC Supply Voltage	VDC		
	DC Current	mADC		
FUSES				
On Mains			2 External fuses F25T 10x38 (Threephases 230V)	
On services				
On AUX Power supply				
On P.A. Supply				
On fans Supply				
MECHANICAL DIMENSIONS				
Phisical Dimensions	Front panel width	mm	483	19" EIA rack
	Front panel height	mm	132	
	Overall depth	mm	655	
	Chassis depth	mm	650	
Weight		kg		
OPTIONS				
Internal Attenuator		code	30dB to enter with 1W	
		code		
		code		
		code		
TELEMETRY / TELECONTROL				
Telemetry connector inputs	Pulse		Command ON	
	Pulse		Command OFF	
	Pulse		Alarm Reset	
Telemetry connector outputs	Analogical level		FWD power	3,9V x 1000Wps
	Analogical level		REF power	3,9V x 100W
	Analogical level		Internal SWR	Disabled
	Analogical level		Input power	3,9V x 0dB
	Analogical level		VPA	3,9V x 50V
	Analogical level		IPA	3,9V x 60A
	Analogical level		Temperature	3,9V x 100°C
	Open Collector		Status ON	
	Open Collector		Status OFF	
	Open Collector		Power Good 1	
	Open Collector		Power Good 2	
	Open Collector		SWR	
	Open Collector		Wait	
	Open Collector		Fault	
	Open Collector		Local	
	ON / OFF level		Interlock	
TELEMETRY-TELECONTROL SW				
Telecon				
VARIOUS				
Cooling type			Forced with internal fans	
Potenza dissipata in calore		W	1500 with red pattern	
Acoustic Noise		dBA	<75dBA	Leq 3 min @ 1 m
STANDARD COMPLIANCE				
Safety			EN60215:1989	
EMC			EN 301 489-11 V1, 2, 1	
Spectrum Optimization				

5. Setting

5.1 Setting on air

1. Connect the RF output power of a suitable TV exciter (e.g. the DTVPE of R.V.R. Elettronica) to the RF input (**RF** module) using a cable fitted with N type connectors. The exciter should be set to minimum output power and switched OFF.
2. Connect the amplifier's INTERLOCK output connector to the exciter's Interlock input, if available (it is available in all RVR Elettronica exciters) using a twin wire with BNC connectors.



Note: the amplifier's INTERLOCK output connector is an output signal on coaxial BNC type connector. The operating logic is as follows: the internal conductor is floating when the amplifier works correctly, else is closed to GND. When INTERLOCK signal is closed to GND, RF output power from exciter MUST shut down.

3. Connect the RF output to the antenna system cable suitable to stands the RF output power of the amplifier (antenna system means RF ouput filter and antenna feeder).

5.2 Setting on lab

1. Perform connections described in the previous chapter from point 1 to point 2.
2. Connect the RF output to a dummy load suitable to stands the RF output power of the amplifier.

6. Start Up

6.1 Important to Know

The amplifier must laid-on firmly before its switch-on. Mechanical tension and mobility of some parts can stress sensitive electrical connection, some of these are tuned accurately for the working RF channel and so, their fixing may be a demanding job. User should take care about RF output connection, grip all screws fairly and secure RF output filter and its interconnecting transmission lines.

The amplifier is composed of two parts electrically interconnected by three cables (see description section 6.2 for a more detailed information about the amplifier's composition). User must not supply mains voltage until all interconnection between parts of the amplifier are fully inserted and locked.

The air for cooling plant must be sufficiently available; temperature and humidity of the environment also are very important variables to take account for. Reliability of the amplifier and all partnered equipments is largely dependent by environment's physical parameters, amplifier is equipped with a complete set of protection remedies and these remedies are essential in the acute phases but, in the long run, aging in advance will arrive. Usually the amplifier is housed inside a 19" standard cabinet, enclosed in its turn in a working room. User should design the overall placing in order to avoid air flow suffering and so, the adequate quantity of air needed by the amplifier.

The amplifier takes its cooling air from the room where it is placed in. Cooling air must be clean, presence of thick dust, smoke, steam, fog, small insects and inflorescence, may compromise life's expectation of the equipments. The amplifier is equipped with grilles in the air intake, these grilles must be periodically inspected and, in case, cleaned. Frequency of maintenance is directly subordinate to air's quality; a three months period is the recommended rate.

The amplifier's cooling plant maintain temperature of inside parts at an admissible level to work. When the amplifier shutdown, whether by intervention of crcuit protection or user's decision, cooling system does not arrest immediately, it runs for a more time after main service stop. This operating procedure prevents temperature rebounding, a well-known phenomenon that affects all compact equipments. We recommend user do not break mains voltage without having put in 'OFF' state the amplifier and before the end of the autonomous fan arrest time.

The amplifier is provided with lots of fans. Each fan is equipped with an auto-resettable fuse connected in series, this acts as an overload protection. Fan is the most subject to usury component of whole equipment so, failure during the normal life's time expectative of the amplifier is unavoidable. When a fan fails, a related auto-resettable fuse isolates it from the common fans feeder preventing a complete halt of the equipment. The amplifier works anyhow, but the margin of temperature balance is reduced and no indication is offered to the user. The short period of maintenance recommended (around three months) warrants that such an occurrence may not become an annoying trouble-shooting section.

Concerning mains voltage wires, these must be assured with their terminals. Neutral and Ground connection particularly is a very worrying matter. A well made Ground connection assures safe interaction between users and equipments. In a three phase star configured mains voltage connection, Neutral wire is very important. In such a configuration, when Neutral connection is precarious or even worse broken, permanent serious damage occur certainly to the amplifier. Mains voltage supply of electrical plant must be provided with an adequate line breaker, and this breaker must assure that Neutral connection become interrupted simultaneously the other lines. The worst case occurs when in a three phase star configuration, two (or three) electric lines are connected and Neutral is not. In the elecrical supply plant, Ground and Neutral connection ever must be wired without fuse in series. For user's safe, Ground connection must be marked by very low impedance toward Earth. User must take account that, when mains connector is inserted in the receiving PS module, mains voltage is available to all equipment and so it is practically ready to run.

Note: Factory recommends customer to specify in advance his preferred mains voltage option. The changing of mains voltage configuration is not a so demanding job, but final measurement section in factory's laboratory reflects better the real state of things if nothing has been modified after.

6.2 Quick Start

The scope of this chapter is to summarize the procedures for installing the machine. If any point is not fully comprehensible, such as how to operate the machine the first time, it is advisable to read the entire manual very carefully.

In this description it is assumed that the amplifier is not supplied pre-installed in a rack inside a transmission system. In this case most of the operations outlined herein (for instance the wiring ones) are obviously not necessary.

Unpack the amplifier and firstly check that it has not been damaged in any way during transport. Check that all connectors, in front and rear panel of the equipment, are undamaged and controls on the front and back panels are in good order.

Check, if required, that the fuses are installed, in good working order and accessible on the back panel. The required fuse values are as follows:

	@208/230V single phase	*@208/230V three phase*	*@400V three phase*
MAINS FUSE *(chap.4.3 - position [8] & [11])*	**(2x) F25T type 10x38**	**(2x) F16T type 10x38**	**(2x) F10T type 10x38**

After having plugged the mains power cable to the MAINS connector (the MAINS connector is a terminal box. Ensure that the wire is not live before performing the connection) at the back of the machine, power on the amplifier via the switchboard.

The ON LEDs on both modules will turn on and the forced cooling fans will start running. The LCD shows the introductory screenful and then switches to a screenful that indicates the forward and reflected power values.

Turn on the exciter (at lowest power) and wait for its complete bootstrap routine. Once ready, increase RF power output gradually and check on amplifier's LCD display. Increase the exciter's power until the amplifier's RF output power attains the planned value.

All machine's operating parameters may be checked remotely via a remote hardware/software control system.

As a rule, the amplifier operates automatically. If any alarm conditions occur, they will be managed automatically by the protection system and notified to the user by means of LEDs on the panel and messages on the display.

6.3 On Air

The amplifier always must be connected to antenna (or dummy load), also when in absence of RF excitation. Above all, risky occurence comes up when the amplifier is put in 'ON' state putting DC power supply available to RF units. When the amplifier is connected to an RF output filter, as mostly, and its output can't find a receiving outlet, self oscillations in RF field may arise so strongly that permanent damage in the RF output filter may occur.

The amplifier must work at a precise level of RF Output power, admitted tollerance is within +/- 0.5 dB. The amplifier and its own exciter are mutually fine tuned in order to comply the RF signal quality requirements of Communications Supervisory Authority. These adjustment, linear and non-linear pre-correction for understanding, are greatly dependent by RF output power, so this output level cannot be freely modified after having reached the satisfactory result.

It would be better that the amplifier do not work bordering its limit of any protection. If an environment's parameter reaches the protection threshold, the amplifier is switch off. The right work load for the amplifier is a careful user's choice, although amplifier is ever self-protecting, some available operating margin can compensate environment's parameters fluctuation, avoiding invalid transmission times.

The antenna is the natural outlet of RF power supplied by the amplifier. Working stability of the antenna is prominent in order to warrant the quality of transmitted RF signal and for equipment's reliability. Amplifier can manage antenna's anomalies but, its duty is to defend itself only. Nothing is set in action by the amplifier in order to remedy about integrity of RF transmitted signal, so it is a customer's liability to warrant antenna's working stability or, otherwise, to provide an arrangement that deals with this consequence.

About user interface, the amplifier can be set in two modalities, ‘LOCAL’ or ‘REMOTE’. This double option is selectable by ‘Fnc’ → ’Sts’ menu. We suggest customer to set this switch in ‘REMOTE’. No damage occur to the amplifier also if it operates continuously in ‘LOCAL’ set, but user has faculty to set unintentionally the amplifier to operate in a different mode then planed, especially when navigating amid menus with a not firm skill. When amplifier is a part of a complex system, for instance a transmitter employing several items combined, the ‘REMOTE’ set is the strongly recommended, also in order to allow the System Manager Unit to best interacts with all other partners joined.

Amplifier(s) and an exciter (synonymous of Modulator) complete a transmitter equipment. Both these units work in synergy but operate independently by their own Hardware/Software endowment. The exciter unit supplies RF modulated signal to the amplifier, the amplifier interacts with a feedback signal, often referred as ‘INTERLOCK’. Interlock signal can arrest RF supply from exciter, this occur when protection circuit or user’s action has imposed a general stop. Interlock action is not a safety issue about the amplifier integrity, but when RF is still supplied during a stop phase by the exciter, a residual RF signal flows through the amplifier’ circuits till the antenna. In many countries such an occurrence is unlawful.

The amplifier is equipped with an autonomous circuitry that manages entirely every working state and defends all amplifiers’ parts by means of protection routines. No equipment joined with the amplifier cans by-pass a protection action. This restriction is essential when an amplifier is included as a ‘slave’ partner in a combined system. In such a system, a wider interaction among all partners is put into action by the main equipment and so, some contradictory settings may be set followed then by incoherent behaviors. Because the high power handled, an overall incoherent behavior may damage some part of the plant or, as frequently, the transmitted signal may not comply all recommendations of Communications Supervisory Authority. In this case, user must follow all technical information related to the complete system.

7. Hardware

7.1 Identification of the Modules

7.1.1 UHF Version Upper view (ATVCA1K0LU1)

The figure below shows the equipment upper view with the various components pointed out.

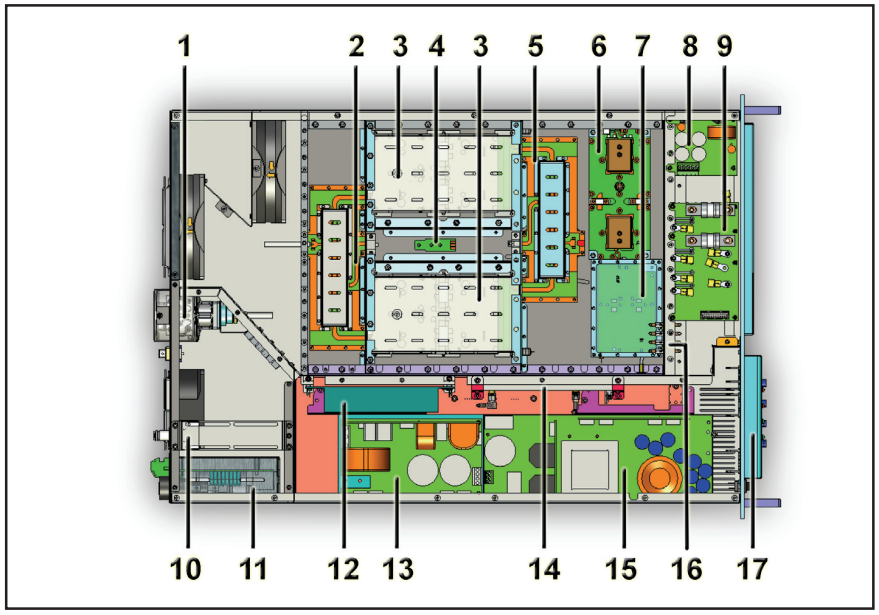


figure 7.1

[1] TV Peak Directional Coupler Card (*SL192DC1001*)
[2] Combiner
[3] RF Module Card (*RFPAUHF800A*)
[4] Thermal Probe Card (*SL024MT1001*)
[5] Splitter
[6] RF Driver Amplifier Card - 20W 8VSB UHF (*SL149RF1001*)
[7] RF Pre-Driver Amplifier Card - 2/4W (*SL149RF1001*)
[8] Switching Power Supply - DC/DC 50/32V 5A (*SL192PS2001*)
[9] Current Meter Card (*SL192MT1102*)
[10] Attenuator Card - 30dB 2W (*SL192AT1001*)
[11] Surge Protection (*SLSRGPRPJ1KM*)
[12] Service Power Supply (*PSASP-150-24*)
[13] PFC Card *(PFCPSL5060)*
[14] Input Card (*SLTVINAMP01*)
[15] Power Supply - 50V 60A (*PSL5060*)
[16] Feedthrough Card (*SL176FI1001*)
[17] Panel Card (*SL202PC1002*)

7.1.2 UHF Version Bottom view (ATVCA1K0LU1)

The figure below shows the equipment upper view with the various components pointed out.

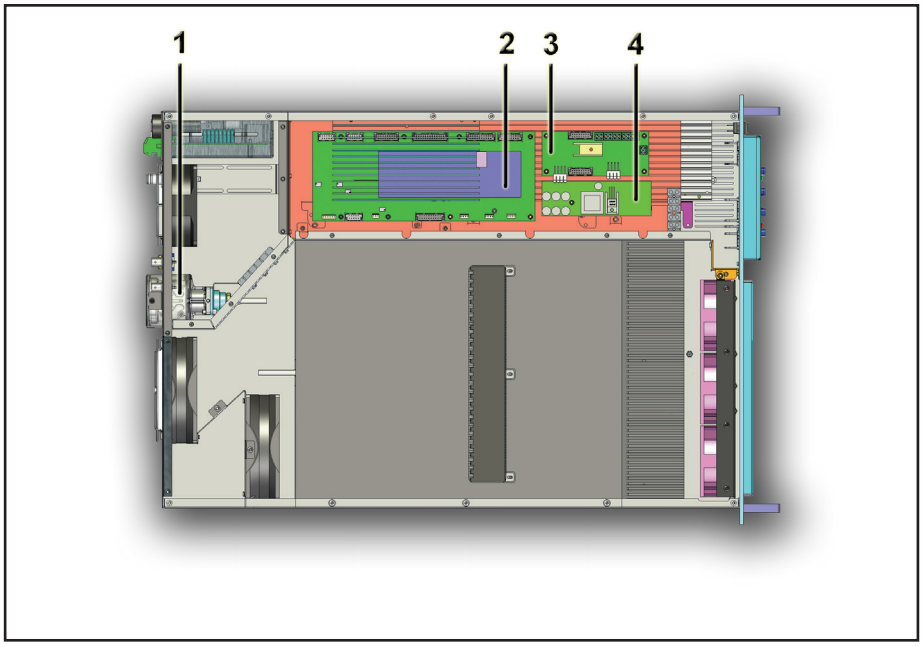


figure 7.2

[1] RF Monitor Directional Coupler (*SL192DC2001*)
[2] Interface Card (*SL192IN1003*) + CPU 16 Bit (*SL034CP1001*)
[3] Fan Control (*SL192PS1002*)
[4] Auxiliary Power Supply (*PSL300-AUS*)

7.2 Descriptions

7.2.1 Interface Card

This card has the following main functions:

1. Normalization of all the analog signals from various sensors/detectors and hand them over to the CPU.
2. Implementation and management of hardware high-speed protection to protect the machine.
3. Interfacement for telemetry and serial communication with the CPU

In particular:

1. Standardization reading directional coupler with digital trimmer SPI, rms and peak detector.
2. Reading current/voltage.
3. High-speed protection on forward, reflected and input power.
4. High-speed protection on PA current.
5. Gain control.
6. Fan control.
7. Power control (On/Off).
8. Generating the necessary power (+5V, +12V, -12V ...) to the card.
9. DB25 telemetry interface.
10. RS485/232.
11. Standardization of temperature measurement.
12. Interlock.
13. Management of display interface.
14. Common bus.

7.2.2 Input Card

This card is the first circuit that the RF input signal meets entering into amplifier. It has a control bus and power supply, an input and an output connector. This card works closely with the interface card to monitor the input and output signal and to protect the entire amplifier.

This card has the following main functions:

1. Measurement of input power.
2. Gain Control.
3. Input fast interruption.

7.2.3 RF Pre-Driver Amplifier Card

This is the first stage of RF amplification. Works with power below 1W and has a gain of about 18dB. It ‘s a class A amplifier, with a feature of high linearity.

It has an RF input, an RF output and a power connector.

7.2.4 RF Driver Amplifier Card

The driver is an RF amplifier that can drive the RF final. Works with power of about 10 watts and has a gain of about 15dB. As for the pre-driver module, this also has a feature of high linearity.

It has an RF input, an RF output and a power connector.

7.2.5 RF Module Card

This card is the last stage of RF amplification. It has a rated power output of 500Wps and is configured to work in class A / B.

It has an RF input, an RF output and a power connector.

7.2.6 Splitter

This module is used to split the output signal of the driver to pilot two RF module. It has an RF input, two RF outputs and an unbalanced load of suitable size.

7.2.7 Combiner

This module is used to sum the output signal of two RF amplifiers. It has two RF inputs, an RF output and an unmbalanced load of suitable size. It has features of high isolation between the two RF inputs and it is able to combine power up to $1000W_{PS}$.

7.2.8 Directional Coupler

This card delivers the amplified RF signal to antenna and makes reading of forward and reflected power. The taken measurements are delivered to interface card. The reading head is able to detect the peak sync or the rms value and has a high linearity.

7.2.9 Current Meter Card

This card implements two functions. The first is the reading of currents that are absorbed by the RF power amplifiers, driver and pre-driver. The second function is to provide electric protection through fast intervention fuses. The measurements taken are delivered to the interface card.

7.2.10 Surge Protection

This card is the first stage of power supply. It is directly connected to the electric system and protects the afterwards card. Within the devices are inserted to protect the equipment from surges.

7.2.11 PFC Card

The PFC is responsible of aligning between apparent power with real power that is absorbed by the equipment.

7.2.12 Power Supply

The power supply provides the electric power to the entire RF amplification system. It is a switching power supply DC/DC 310V 50V/60A. Besides being a section that handles the power, also has a control that protects the power supply itself in the event of overload or high temperature.

7.2.13 Switching Power Supply

This card is a switching power supply DC/DC. It is used to feed the RF amplifiers, RF driver and pre-driver which need 32V, unlike final RF.

7.2.14 Service Power Supply

This card is a service power supply AC/DC that is used to feed the fans and the entire control electronics.

7.2.15 Auxiliary Power Supply

This card is a switching power supply DC/DC. It converts the 24V from the ASP-150 to lower voltages (+7V, +18V, -18V) to feed the control electronics.

7.2.16 Fan Control

This card is controlled by CPU and provides to switch on and off all fans of equipment. Through auto-restoring fuses avoids the turn off of all fans, in case of malfunction of one. Moreover distributes power to the interface card.

7.2.17 Panel Card

This card is the interface between equipment and user. It has a 16x2 character display for viewing all menus, the four buttons for selection and four status LEDs.

7.2.18 CPU

The CPU is the central processor unit of entire equipment. From here start and return all the signals. This is mounted on the interface card, because it has a continuous exchange of information with it. It captures all measurements from interface card, running some slow protection, manages the ramp rise and implement all the various settings performed in the Set menu.

8. Firmware

8.1 Descriptions

This chapter describes the ways in which the microprocessor controls the amplifier and how the user may interact by software.

Symbols listed below appear in the left portion of the display:

- _ (Cursor) - Blinks selected (i.e. accessible) menu.
- ▶ (Filled arrow) - Editable parameter marker. This symbol appears in menus that take up more than two lines to aid browsing.
- ▷▷▷ (Three empty arrows) - Parameter is being edited.
- ▷ (Empty arrow) - Current line marker; the parameter in this line cannot be edited. This symbol appears in menus that take up more than two lines to aid browsing.

The figure in the follow shows the overall software user interface diagram.

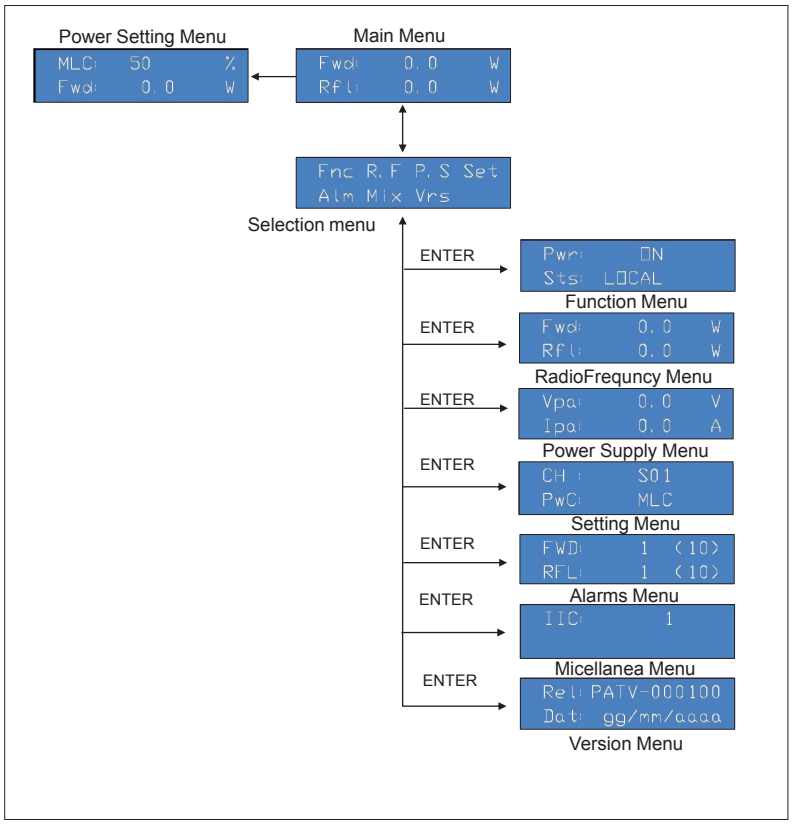
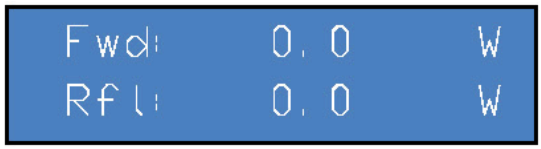


Figure: *Flow diagram of the software*

Note: the user may interacts with the equipment only when in LOCAL mode by means of the selector. When not il LOCAL mode, the user may only read parameters and not change them.

When turned on, the LCD shows the introductory screen with the equipment's software and hardware versions.

A few seconds later the main screen shows RF output forward and reflected power values:



Press the ESC key to view the selection screenful from which to access all the menus:

To access one of the submenus select its name (which is underlined by a blinking cursor) using the RIGHT or LEFT keys and then press the ENTER key.

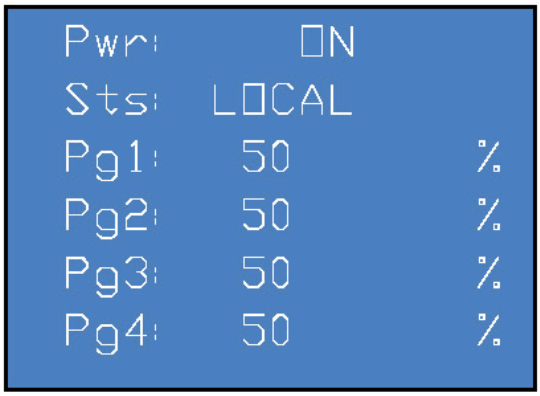
Take note that certain parameters are named but their values are not available. This occurs when a parameter is useless for control software internal use.

When the value of a parameter is not available for the aforesaid reason, symbol "**==**" appears on the display in lieu of the value.

8.1.1 Function Menu (Fnc)

In this menu, you can set **RF output power** On/Off, toggle between "Local" or "Remote" control mode and set the **Forward Power Good (PgD)** threshold level.

In order to edit a row, highlight the appropriate row using the ↓ or ↵ buttons and then press and hold the **ENTER** button until the command has been accepted. This way, **Pwr** setting is toggled between **ON** or **OFF** and **Loc** setting has been toggled between **LOCAL** or **REMOTE**. In order to edit Power Good threshold in **Pg1 to 4** rows, edit its value using buttons ↵ and ↓ ; finally, press **ENTER** to confirm.



`Pwr` It enables (ON) or disables (OFF) the RF power output.

`Sts` It modifies machine operation. In the LOCAL mode, the machine can read and modify its operating parameters through the navigation keys and the management firmware, whereas all other setting gates are locked out. In the REMOTE mode, the machine can only read its operating parameters; in this case parameters are modified based on the command received from other connected telemetry system.

`Pg1` It modifies the Power Good (forward power) threshold. The Power Good level is a percentage of machine's rated power (1000 W), not of forward output power expressed in Watt. This does mean that this threshold when set at 50% will give a warning at 500 W (=50% of 1000W). When RF output power drops below the Power Good threshold setting, the machine changes the state of pin [9] of the DB25 labelled 'Telemetry' connector located in the rear panel.

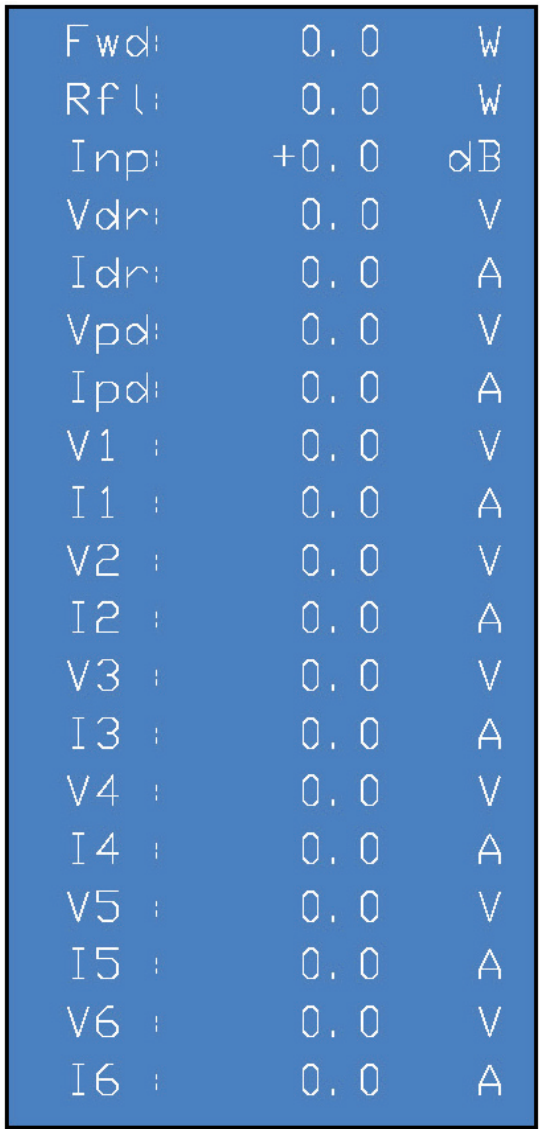
`Pg2` See PG1. The machine changes the state of pin [22] of the DB25 labelled 'Telemetry' connector located in the rear panel.

`Pg3` It modifies the Power Good (reflected power) threshold. The Power Good level is a percentage of machine's rated power (100 W), not of reflected output power expressed in Watt. This does mean that this threshold when set at 50% will give a warning at 50 W (=50% of 100W). When RF output power drops below the Power Good threshold setting, the machine changes the state of pin [18] of the DB25 labelled 'Telemetry' connector located in the rear panel.

`Pg4` See PG3. The machine changes the state of pin [4] of the DB25 labelled 'Telemetry' connector located in the rear panel.

8.1.2 RadioFrequency Menu (R.F.)

This page holds all reading related to machine's RF power:



Note that these are reading, rather than setting and cannot be edited (note the empty arrow).

`Fwd` Forward power reading.

`Rfl` Reflected power reading.

`Inp` Input power reading.

`Vdr` Driver voltage reading.

`Idr` Driver current reading.

`Vpd` Pre-driver voltage reading.

`Ipd` Pre-driver current reading.

V1 Pallet 1 voltage reading.

I1 Pallet 1 current reading.

V2 Pallet 2 voltage reading.

I2 Pallet 2 current reading.

V3 Pallet 3 voltage reading.

I3 Pallet 3 current reading.

V4 Pallet 4 voltage reading.

I4 Pallet 4 current reading.

V5 Pallet 5 voltage reading.

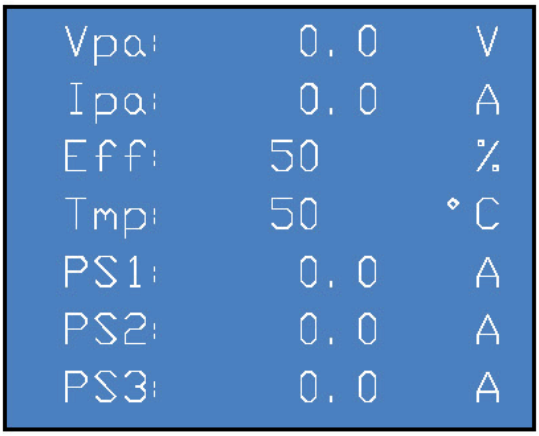
I5 Pallet 5 current reading.

V6 Pallet 6 voltage reading.

I6 Pallet 6 current reading.

8.1.3 Power Supply Menu (P.S)

This page shows the reading relating to final power stage and power supply:



Note that these are reading, rather than setting and cannot be edited (note the empty arrow).

Vpa Voltage supplied from amplifier's module.

Ipa Current absorbed from amplifier's module.

Eff Efficiency based on ratio between RF forward power and power supply of amplifier module.

Tmp Internal temperature of the machine.

PS1 Current absorbed from power supply 1.

PS2 Current absorbed from power supply 2.

PS3 Current absorbed from power supply 3.

8.1.4 Setting Menu (Set)

In this menu, you can set the working channel (**CH**) and power control (**PwR**).

`CH` Set the working Channel.

`PwC` Set the power control function.

8.1.5 Alarms Menu (Alm)

This menu shows any alarm condition occurring during machine's operation. Alarm thresholds are preset by factory.

`FWD` Counter of alarm conditions triggered by forward power.

`RFL` Counter of alarm conditions triggered by reflected power.

`INP` Counter of alarm conditions triggered by input power.

`IPA` Counter of alarm conditions triggered by current absorbed.

`Reset Alm`
Alarm counter reset.

Alarm conditions are numbered from 1 to 10 and reflect the following situations: forward output power too high, reflected output power too high and input power too high.

Alarm monitoring cycle is as follows: when an alarm condition is detected, alarm counter increases by 1 unit, machine goes into lock-out state and the display shows the halt cause (chap. 8.2). After 15 seconds, the machine attempts to re-start; if a new alarm condition is detected, cycle is repeated over and over again up to 10 times maximum.

If machine re-starts successfully, all alarm counters are reset after 30 minutes of regular operation. After 10 alarm conditions triggered by the same cause, the machine goes into fault lock-out mode, a lock-out mode warning appears on the display and the 'FAULT' LED turns on.

After an alarm condition has been rectified, the counter may be reset by highlighting 'Reset Alm' and holding down the **ENTER** key a few time.

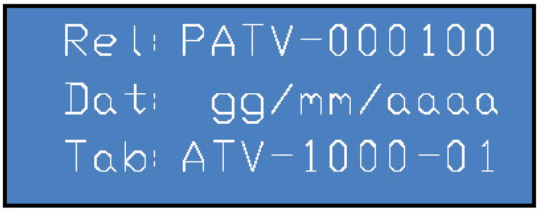
8.1.6 Miscellanea Menu (Mix)

This menu lets you set machine address in an I²C bus serial connection:

`IIC` I²C address setting. The I²C network address becomes significant when the exciter is connected in an RVR transmission system that uses this protocol. Do not change it unless strictly required.

8.1.7 Version Menu (Vrs)

This page holds machine's version/release information:



Note this is a reading, rather than a setting and cannot be edited (note empty arrow).

`Rel` Firmware release information.

`Dat` Release date.

`Tab` It shows table loaded in the memory.

Working Logic

8.2.1 Protection System

The protection system implemented inside the amplifier is based on one type of intervention.

The Shut Down type of reaction consists in turning OFF the equipment's amplifying section when a specific variable exceeds a set value.

Depending on the type of event occurred, and after the amplifier has been turned OFF, it will be reactivated after a set length of time or only after the sharing, which caused the locking, has been cleared. In the alarm menu the first type of configuration is indicated by **X - (Y)**, whereas the second one is indicated by **Wait**. The third possibility is that the system does not trigger the protection conforming to a specific parameter: this is indicated by **Dis**. (Disabled).

While the amplifier is OFF temporarily owing to an alarm, the yellow WAIT LED lights up and the reason the protection was triggered is shown on the display.

When the protection system trips due to a "cyclic" type parameter, a counter begins counting up (the X value in the alarm menu). If the counter reaches the max admissible cycle value (Y), the amplifier turns OFF definitely and the red "FAULT" LED lights up on the front panel.

The user may press the ALARMS RESET key to interact with the protection system. The effect differs depending on the machine's status when the key is pressed:

- If the equipment is off, waiting for the cycle time to be reached, or if it is definitively off in FAULT state, press the ALARMS RESET button to immediately turn the amplifier ON and reset the alarm counters.
- SIf the system is transmitting but alarms were triggered earlier causing certain counters not to be at "0", pressing the key will have no effect unless it is pressed while inside the alarm menu. As such, the system will be sure that the user takes note of the alarms that were triggered before resetting them.

The system resets the alarm counters automatically after thirty minutes of operation, i.e. the user need not do anything, if the amplifier does not trigger any alarms or after the machine the machine has been turned OFF and then back ON.

8.2.2 Alarms and Faults

There are four types of alarms that can cause a machine lock-out and trigger a "WAIT" indication , then an appropriate yellow LED turns on. **When any one of the three alarm thresholds is exceeding, the system will automatically switch to the warning screen (even if user is browsing another system menu) and the following messages are displayed:**

1. **Over Forward Power**

Forward power threshold exceeded.

2. **Over Reflected Power**

Reflected power threshold exceeded.

3. **Over Input Power**

Input power threshold exceeded.

4. **Over Input Power**

Current absorbed threshold exceeded.

Monitoring cycle is as follows:

- An alarm condition occurs;
- Alarm is displayed and device is locked out for 15 sec.;
- Operating conditions are restored;
- Verification.

Upon reaching the 10 cycle limit, a “FAULT” indication is triggered and the device goes into lock-out mode, then an appropriate red LED turns on and this screen is displayed:

I. **Over Forward Power**

Forward power alarm display.

II. Over Reflected Power

Reflected power alarm display.

III. Over Input Power

Input power alarm display.

IV. Over Input Power

Current absorbed alarm display.

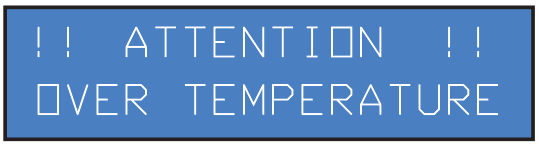
Once the machine goes into ‘FAULT’ mode, it will no longer attempt to re-start; user may choose the appropriate reset procedure according to current machine setting:

- Machine set to LOCAL control option - press ‘Reset Alm’ in the alarm menu (Alm) or power off and back on again using the POWER switch.
- Machine set to REMOTE control option - power off and back on again sending the appropriate command via the “TELEMETRY” DB25 connector.

Over temperature is a fifth alarm that does not trigger a permanent ‘WAIT’ condition,when it occurs the machine temporarily interrupts its working. It occurs if temperature exceeds 85°C (Celsius degrees), appropriate yellow LED turns on and the following screen appears:

5. Over Temperature

Temperature power threshold exceeded.



Machine restores itself when temperature become regular and no protection counter is incremented.

Out of gain is a sixth alarm that does not trigger a permanent ‘WARNING” condition,when it occurs the machine doesn’t interrupts its working. When it occurs, appropriate yellow LED turns on and the following screen appears:

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